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Remarks on the Native Tongues in the Neighborhood of Port Darwin.

By T. A. Parkhouse, formerly Accountant and Paymaster S.A. Railways, Port Darwin.

[Read November 6, 1894.]

The aborigines in whose country Port Darwin is situate are the Lárraki'a, of whom Mr. Paul Foelsche has given some interesting particulars in a previous paper.* They inhabit a tract of land embracing the seaboard from Shoal Bay to Southport, together with some portion of the country west of that port. At the forty-six mile on the railway line we pass their southern border, and going through a neutral belt of some eight or ten miles, strictly preserved and upon which none trespass without good reason, at near Rum Jungle enter into the territory of the Awárra, whose southern boundary is the Howley. At about Fountain Head commences the country of the Aggrakúndi, extending to the Union and perhaps to near Pine Creek. Beyond Pine Creek to the Katharine are the Adówen (?) and Mennagi (?). To the east of the Lárraki'a, from Marrakai cattle station on the Adelaide River to Shoal Bay and thence along the seaboard to beyond Escape Cliffs, are the Wúlnar; and east of these again and abutting on the Aggrakúndi are the Mary River (? Berigurruk) and Alligator River tribes, the country of the latter extending south as far as the Eveleen.

These districts are subdivided among the several families of the tribes. I am of opinion that each family has its own proper name, but I have no evidence that this is the case; nor do I find totems, or that there is any restriction as to food. The laws governing marriage, too, remain to be discovered; I have little information except that in certain instances, where the individuals were pointed out, *a* would have been the wife of *b* had *a* been born a girl, or *b* the wife of *c* were *b* female A Lárraki'a stated, in the first instance, that the issue was from a common forefather, *b* being descended in male line from one wife, and *a* descended in female line (until *a*) from another wife. These cases may simply mean that the parents arranged a marriage before the birth of the infants, sex being favorable.

These natives are tall, well-set, and of an excellent carriage. They are clean-limbed and with little hair on the face, thus differing from the race south of the MacDonnell Ranges, to

* Transactions Roy. Soc. S.A., vol. V., 1881-2.

whom they are superior, not only in stature and symmetry, but, generally speaking, in feature likewise. The aborigines of the Alligator and Mary River tribes, which possess similar characteristics and will probably be found to be in alliance, are the finest in physique and apparently the most numerous. They are feared by the other tribes, whom they hold in small esteem. A party of the former tribe every year or two make their way to Port Darwin, but they are not welcome visitors and the Lárraki'as breathe more freely when their five or six weeks' sojourn is at an end. At Burrundi, where a camp is formed by some of them nearly every year, the Aggrakúndi vacate the place entirely at their approach. Their speech is fuller, deeper, and more resonant than that of the others, and I regret that I am unable to give examples—"kwao*kh*-dong-'aok" (fire), Alligator River, is the only word I have noted.

Second to these physically are the Wúlna*r* and Lárraki'a, allied tribes between whom intermarriages are frequent; some families of the Wúlna*r*, indeed, have a permanent camp at Port Darwin. In the speech of the Wúlna*r* a pretty intonation is observable, not used by the other tribes, but which Mr. Joseph Bradshaw tells me he found in a tribe in the north of Western Australia. The cadence is especially noticeable in the conversation of the girls and younger women, but, curiously enough, I have not heard it adopted by a Lárraki'a conversing in Wúlna*r*, nor is it used by a Wúlna*r* speaking Lárraki'a. For example, "enough" is in Lárraki'a "bánuk," and in Wúlna*r* "bi-léi-ya;" or, while a Lárraki'a calls a mosquito "lámtda," an Awárra says "nael," and an Aggrakúndi "kimmiel," the Wúlna*r* chants "mung-or-ung-er-er." So also in "unggoingi," the first syllable "ung-" is said in an even tone, there is a fall upon "-go" gliding into "in-," and a rise for the final syllable "-gi."

Inferior to the Lárraki'a and fewer in numbers are the Awárra and Aggrakúndi, who again are allied tribes; indeed they have been hitherto known to Europeans only as Wulwóngga, and a member of either tribe will so designate himself. The Aggrakúndi, it is said, were formerly more powerful and in alliance with a tribe called Awinmül, whose head camp was at Burrundi, but the mortality of one bad season so reduced the numbers of both tribes, and especially of the Awinmül, that they became one.

There is no dialect common to any of these tribes in addition to the tribal tongue, as in some parts of Queensland. A Lárraki'a can hold no converse with a Wúlna*r* unless one has learnt the language of the other, nor an Awárra with an Aggrakúndi except he be bi-lingual. The construction of the language, however, is the same throughout, the difference being merely in

the words used, and its simplicity is well exemplified in the examples given at the foot of each page in the vocabulary annexed.

The Lárraki'a verb is often in some moods and tenses rendered by the same form, as "mogwiri," you two go, or may we two go, or will we two go. Thus "ngigāri mogwíri," where the variation except for euphony is only in the pronominal prefixes "ngi-" and "mo-," meant "you go on (ngigāri), we two will come after (mogwiri);" "bágbirra mogwíri banmogwínma" was a question in which one of two boys asked whether they might carry my bag; "brédema mógwiri baimítum," spoken to their fellows at another time, explained that the speaker and another lad were on the way to buy bread. The indicative future-simple and the perfect are rendered: as "neggellipmerk," you will return, "neggellipmenerk," you have returned. The imperative, "give me," is "an-ngok," and "I am about to have given to me" is "annagok;" as, "erribókwa ánngok," give me a light, "tobákkwa ánnagok," he is going to give me tobacco presently; "nágok," I give to you, "mínnannagok," he will give to you and me. "Ngigíddjyi" tells one to arise; "neggogiddjyi" enquires whether you are getting up or asserts the fact.

Thus, "dallipmenérk dállípbing" indicates in *da-* the third person plural, *-alip-* is the root, *-me-* the perfect tense, *-merk* the direction towards and not from; while *-bing* in the second word denotes the continuance of their absence, the meaning being, "They have come back and cleared out"—broken up camp, gone away not to return. So in "dállípbing dálaji," they have cleared out and gone away. While, as in "ngigári" in the example given above, "go" is "-gāri," "gone" is represented by *-laji*, and for "been gone" *ára* is prefixed; as "bíláji," he is gone, "bárabiláji," he has been gone. As "-merík" indicates the direction towards, so *-um* signifies "from"—"nógólderk," for instance, run to me, "nógoldum," run from me.

In nouns I find no variation in declension for number, person, or case.

The Lárraki'a personal and possessive pronouns are—

Separable.	Inseparable.	Separable.
ánannga	an-, I, me	ánagi, mine
ámille*	— I myself	ànang-emìlla, belongs to me
ít'úma	ngi- *or* ne-, you	it'ennagi, yours [myself
yába	bi-, he, she, it, him, her	biánnagi, his, &c.
bimilla	— himself, &c.	
dorendbirra	— we, us	dorennagi, ours
moanmi*l*la	mo-, you and I, he and I	moánnage, belongs to us two
biddendbira	do- or da-, they, these	biddennági, them

* -muella (German ü) is a term of emphasis, as "patj'i," he is good; "patch'imilla," he is good fellow, *i.e.*, very good.

to which must be added the inseparable "go-," this fellow, "kwond-," those fellows, and "gonbodénnagi," belongs to this or those fellows.

I have not learnt an inseparable first person plural as distinct from the third, or any second person plural. "Ngigári" (be off with you), for instance, was used in addressing several or one; Father Konrath has, however, "gurangura," you, and "gurennege," yours (pl.).

One notes in the Lárraki'a first person singular "ananga" the similarity to the Hebrew "anoki" and the Moabite "anak;" followed in Wúlnar by "tanúnga" and in Awárra by "ngiak," but lost altogether in the Aggrakúndi "arraman." The first person singular "a-" and "go-" and the dual "mo-" or *mau-* compare with the Polynesian,* and the third person "yá-ba" with *ia*. The occurrence of "it'uma" as a pronoun of the second person in Larraki'a and of *ituma* (ye) in Oceanic is scarcely fortuitous.

So, too, the New Zealand, Samoa, and Hawaii *la* compares with the Lárraki'a "làllira" and Awárra "miral" (sun); Samoa *lalanga* (to broil), and the Polynesian *lani*, *langi* (day), with Lárraki'a "illángwa" (day); Tonga *lo-nguto* (the lips) with Wúlnar "lúngitperner" (the jaw); Samoa *alanga* (to shout), Lárraki'a "aléngea" (to growl, as at an interloper); Polynesian *io*, Awárra "yo," Lárraki'a "g'o" (yes); Hawaii and Tahiti *waha*, Rarot. and Mangar *waa* (talk, gossip), with Wúlnar "weyer" (talk), "waoba" (mouth), "waoler" (laughing), "waol" (ear); Polynesian *wai* (fresh drinking water), *wai-u* (milk, *lit.* breast-water), North Celebes *aki*, *akei*, with Wúlnar "aeke" (water), Lárraki'a "kwiumung-gaoppowei" (milk);† Ceram (Gah.) *arr*, Palaos Islands *arrall*,‡ Lárraki'a "kwarroa" (water); Palaos *tut*, Awárra "dutut" (milk); Bougainville Islands *kala*,‖ Lárraki'a "kallaguk" (one).

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* See Fornander, "Polynesian Race," page 24.

† Father Konrath had "gumungappa" and "quiumungappa," Mr. P. Foelsche "gunnimkappa," and I had written "kwiumunngappa." My boy, however, told me, "That one no proper. You say all same blackfellow—kwí-u-múnng-gáop-powei," a correction I verified when more familiar with the tongue. Although not in use by the Larraki'a, *abba*, *kappa*, &c., are common aboriginal terms for water, and, in association with *amung*, the idiom breast-water is preserved. This link of the Polynesian *wai*, and the *auwei* (water) of South Australian tribes, with the *kappa* of other tribes, although of little value apart from evidence bearing upon the origin of *gaop* is not without interest. The Wúlnar *aeke* and Awárra *wik*, it will be observed, point to wéi k...?... with an apocope, and the Larraki'a *kwaorrowa* to kwo arra wai.

‡ Wilson, "An Account of the Pelew Islands."

‖ Guppy, "Solomon Islands and their Natives."

Many of the words used by the Port Darwin aboriginals recur among far distant Australian tribes—the Lárraki'a and Wúlnar "kap" (be silent) in the *kapo* of the Marowra at the junction of the Murray and Darling Rivers;* "banbanning," Larr., and "illebidbanna," Wúl. (I do not know, *lit.* see), in *illa bano nato*, Mar. (I did not hear); "bunbano," Larr. (women with children), in *kumbunbano*, Mar. (any number of women); "anngoka," Larr., *ngoka*, Mar. (give me), again reproduced in the *nooka* of the Cornu.

Among the Narrinyeri of Encounter Bay *lakkin* (throwing a spear) compares with "laggin," Awárra (throwing away); *yakkai* (ah! oh!), Narr. and Larr.; the Narrinyeri *ngan*, Marowra *ngana*, the *nanni* of the Diyeri of Lake Eyre, *nganno* of the Lake Kopperámano aboriginals, and the Lárriki'a "anannga" (I, me). Again, the Lárraki'a "náow'á" is repeated in the Diyeri *noa* (husband); and "bolinyi" is not lost in the Diyeri *palina* (dead), and, further modified, is traceable in the *palone* of Yardea and *piallano* of Venus Bay.

In eastern Australia we find the Awárra "yo" (yes) in Kamilaroi;† the Awàrra "yan" (come, go) at Georges River, Botany Bay, in the *yannin* of the Dippil tribe at Moreton Bay, and the *yennan* of the Turrubul on the Brisbane River, and it is repeated at Lake Amadeus, Central Australia (*yan*, walk.);‡ the Lárraki'a "gínnyi" (sit), Dippil *ninnai*, Turrubul *nginnen*, and the *nginne* of the Pikumbul tribe at Calandoon in Queensland; Lárraki'a "kwi-amung-gaoppowei" and Dippil *amung* (breast).

As noted by the Rev. W. Ridley, M.A., of Sydney, with respect to the Kamilaroi, so the Lárraki'a gives intensity to any expression of thought or feeling by prolonging the last or the root syllable. Thus the longer yaokkei-i-i is held the greater the expression of wonder or sorrow, the longer the *ai* in "argai" the more intense the pain or the greater the weariness, while in dirriwa he dwells on *dirrr* to magnify the distance.

In Western Australia the Awárra appellation for the moon reappears among the Pidong of the Murchison River and the Wallawe of Yarrgabie Station as the name of the sun ("karrong," *karong*, *kurrung*), the Awárra "yan" (come) in *yannma* (go), *yann*, *yannaji* (come), and the Lárraki'a "negínnyi" in *nginna* (sit); the Lárraki'a "g'o" in Pidong *ngow* or *kwa* and Wallawe *kua* (yes); Lárraki'a and Pidong "yokkai" (oh!). In the *puddja* of the Minninng tribe of the Fraser Range is found the Lárraki'a "paddji" (good), and the Awárra "aliddma" (teeth) in

* Holden, "South Australian Folklore," edited by the Rev. G. Taplin.

‡ Ridley, "Kamilaroi and Other Australian Languages."

† W. H. Willshire, "Aborigines of Central Australia."

the Minninng *thalidd.** Here, too, it is to be observed one word as in Lárraki'a, expresses both eating and drinking.

The same expression "sitting down" for residing or abiding with is observable in the Lárraki'a of the north, the Narrinyeri of South Australia, and among the aborigines on the eastern coast of New South Wales; and I doubt not such other idioms as "Me been lose 'em; by-and-bye me find 'em" (I forgot it; I shall remember presently), "Him bite me" (a thorn prick), "all about" (many), "Water sit down" (a pool of water is there), "What name?" (what is it? what am I to do?) are equally widespread. Idiomatic turns of expression deserve more attention than they receive, and they should be recorded word for word both in the native tongue and in the blackfellow's interpretation in English.

In concluding my paper, I wish to express my thanks to the Rev. Father O'Brien, S.J., of the Northern Territory Mission, for much valuable information concerning the Lárraki'a.

ORTHOGRAPHY.

a, as a in father; *ā*, as in mate; for a in mat, double the consonant, as matt, fann.

i for ee in esteem and for y in any; also frequently for *ue* in German muede; for i in kitchen double the consonant, as kittchen.

ei for ey in they
e " e " met
ai " i " ice
oi " oy " boy
au " ow " now
ao " ao " Macao, and aw in fawn
u " oo " fool, u in full
kw " qu " queen
g, as in gun; *j* for g in gin
dj for dg in dudgeon; *jj* for dge in judge
kh, guttural only
The aspirate is represented by the sign (').

Letters in italics are frequently elided or only indicated.

NOTE.—The aspirate is often associated with the sound of *y*, as in Lárrakiy'a, ity'uma, padjy'i, &c.; although much importance is attached to it, on account of its redundancy and following the usual custom I have omitted it except in a few words. The letters *f* and *v* appear, but the former is rather *pf* or *bf*, and the latter partook of a *y* quality. The *r* final in the Wúlnar is usually a reproduction of the Cockney final, represented by r' in Glossic, rather than an r. To a European ear *dl* is usually heard as *l*, rarely as *d*; but the Lárraki'a is less concerned at the omission of *l* if the *d* sound is retained; *r* is often mistaken for *l*.

* Lindsay's "Journal of the Elder Scientific Exploring Expedition, 1891-2"—vocabularies by L. A. Wells.

VOCABULARIES.

LARRAKI'A.

Afternoon (sun go down), kwillinnowa
adulterer (suspicious character),[1] b'umatium
ah! oh![2] yákkei
all, many, binolka, gonyolka
alligator, gumáondera
alone, 'uludbing; all by myself[3], alludjimilla
altogether (entirely), gwílling
always, bálmok
anger, kwiuroa; a bad-tempered man, kwiuronámbirra
angry—I am, you are, ana-, na--múrring
animal, mámmillbirra
another,[4] gállagawírra
ant (little common), dímmirrínda
apron (male's fringe), l'óiyera
arm, kwíaverndára
armlet, mérákkma
ashes, white, daddag'útida; charred, gwianunóroa
attend, listen, ínna
Baby, dúlda, dórre
back, the, gúmuleng
bad (no good *and* sick)—he is, this fellow is, bó-, gó- -'árra
bag, dáudiwa
bald (forehead big), múdbirma gwíllāga
bamboo, gwier*i*kgwa
bamboo trumpet, mammíllima
bandicoot, kwárrabálla
banian tree, kólonamírma
beats, he, bínyom; one who beats, bínyombirra
before, in front, mólgoroa; one preceding, molgoroamilla
behind, last,[5] írimmkoa
belly, m'údloma; full, neddlabok; empty, góllomang
belongs to me, him, this or these fellows, án-, bía-, gonboden--nage; to me myself, ánang-amille
belt (hair), br'úraelma
between, *or* the middle one, balall
big, gwíllāge, gwíllagwang
bird, mudjira
bite, 'ándowei[6]
black (*see* dark), binyumínnkoe, k'uminnkoe
blackfellow (s. and pl.), bíli*wi*ra
blind (night person), dlāmon-ngapinga
blood, dumáttilla
blunt, kwíunn-gúllpup
bone, nímirringwa
book (*see* marks), mendírrema
box, boat, steamer, mérrima
boy, little, nimm; big, nimmgolólo; children, nímmba
breast, man's, dáramóldera; woman's (*also* milk), kwíumunggáoppowei

1. "What for you come along my camp—you go away? What for you come?" *See* Growl.
2. *Yak*kei bíg'um—"He calls out."
"*Heigh*," *he says.*
3. Kwó-ngiderrkwa 'uludbing kwodlágwa—"I was alone at camp yesterday."
camp alone yesterday.
4. Gwínnbirra gállaga bíddla—"This one who is standing by is another blackfellow—not
This another stays.
the same one."
5. Yogolak írimmkoa—"It is behind, somewhere on that side;" N'írimmgwa gwaiyinga
That side behind.
—"I have left it behind."
6. Kwótkita 'ándowei—"The opossum has bitten me."
Opossum me bite.

bring, gwínnakerk, gwín ngírik; he brings, béggigerk; dual bring,[1] méjerk; bring it, I cannot, gollopolla; brought him, bédjikinnerk
broken—it is, this fellow is,[2] báu*kh*-, kwáu*kh*- -ton*g*
brother, elder, néddla; younger, now'ok; my brother, nállanbirra;

1. Kwarroa gwin-ngírik—"Fetch some water;" Ngigári gwinna—"You go and bring it;"
Water here you carry. *You go carry.*
Bun-ngílla (*or* bonári) áragwa bonáni bedjikinnerk—"Which way have you brought
Little girl, (*or fatherless boy*) *where carry him brought.*
the little girl (*or* fatherless boy) you carry with you?" Ngigari máramar gwinnikerk—"Get
You go knife here you carry.
me a knife."
2. Kwiarrimba baotong—"I nearly broke my hand."
Hand part it is broken.

two brothers or sisters, biníppinapp
bush, the, mólngoroa
by-and-by, mánnagwa
Calf of leg, mórna
camp, kwó-ngiderkwa
carry, bonáni; carry this fellow, gabáon; dual carry it,[3] mogwínnma
carry as children are carried—with a hand between legs, bíáttbirra bórrjin; seated on shoulders, anamínnkera; pickaback, anamíddluk
catch it, g'árri; the down-come-fellow, gudlpin-ga; the falling, bíddlabong
children, nímmbirra
chin, gónn-g'onn-gwa
clean, white,[4] 'arkhngarr
clothing, dumúiya
club, sharp-edged, mommbellégema; round, gwunda
cockatoo, white, arkhngarrwa; black, bíllillilwárwa; tail feathers of black, medémimma
cold—I am, this fellow is, ab-, go--buldópwei; it is cold, dúbboópwei
come! ngúllakk; come to me, núlligan; I, he comes on,[5] á-, nég--garik
come, he will,[7] néggojakk
come back—I, thou, dual, these fellows,[6] á-, ne-, mo-, kwónd--gellippmérik
come back—dual have, they have,[8] mo-, da- -lippmenerk
coming,[9] barakerk
come down, nogúdmilla; am come down again,[10] gúdmilippmerk
come in (*see* inside), negódyerk
come out, they are, dallippmerk; they have cleared out not to return, dallipbing

3. Bágbirra mogwíri banmogwínnma—"May we two go and carry the bag;" Mogwíri
Bag two go ? two carry. *two go*
bágbirra minnmogwinnma—"We two will go and carry the bag on shoulder."
bag shoulder two carry.

4. Arkhngarr bínoa—"Make it clean."
Clean it make.

5. Nimm ngúllak—"Here, boy;" Néggarik mánnagwa—"He will come on by-and-
Boy you come. *To you come on by-and-bye.*
bye."

6. Argwigam néggellippmerk kwondallippmérk—"When do you return? These are
When you come back? These fellows are come back.
come back."

7. Adnlamille neggojakk—"Which way will he come?"
What name come?

8. Dallippmenérk dallipbing—"They have come back, and then cleared out
They have come back; they are come out.
(broken up camp)."

9. Jeinamínbira bárakerk—"A Chinaman is coming;" Aragwa bárakerk bílira—"Which
Chinaman coming. *Where coming blackfellows?*
way are blackfellows coming?" Birámm barakerk—"All of them are coming on."
All about coming on.

10. Also, *leaning against*, as placing a ladder; thus, gudlamárami is to stand one thing against another, or as one resting his back against a post; Biddla dárwin-ng'idung
Him hit, head hide
gomúlwa gud'arging—"He hit him on his buttocks, his head going down," making the
buttocks come down.
figure A "gud."

cook it, gogórapp, gawápp; I have cooked it, ananng-a gurbáoni
copulation, beddijim; he, this fellow, dual copulate or purpose, bengída, kwin-ngída, mogodijji
cough, mámanndíllima
country, béinigerrkgwa
cousin (? actual kinship), némabor
cover me over, menéitchura
crocodile, ann-gállaba
crooked, gurnamadíng-a
cry—I, he, al-, bil--lum; crying bitterly, gwílāgeru bíllum
cut, a, mákkamille
cuts (cicatrices), mammétma
Dark, dlamaongwa; too dark, kumínngoemilli
daughter, allmerk; daughter's husband, noaddjak
day, to-day, now, illángwa

1. Arip gogomille—"How far do I cut (into a water-melon)?"
Into this fellow cut.

dead, báotokk
deaf ("no more him hear"), kwaélla b'uélly*i*dong
devil, biráuel
die (*see* ill)—I, he will, they, a-, bo-, da- -línnyi
difficult (*see* strong), dánkal
dirty, gómúntchüla
dog, little, b'illínnga; big, mámorol; wild (dingo), bánnaminngora
door, miáldama
dream, gúlwao niyáni
drink[2] (*see* eat), gógwe
duck, black, kuriminnbirra
Ear, banárro
eat,[3] gógwe, gomogwe; eating—dual are, they are, minnyi, danyi; eaten—he has, this fellow has, they have, bid-, gar-, dad- -biénni
edge (of a knife—*see* teeth), dlennbérrgkwe
egg, gwiámmgwa
elbow, bórumba
embrace (short quick hugs), bóganār
empty, kw'aotídong; make empty, dākw'aot
emu, langwirra
enough, bánuk
excrement, múnmar
eye, lemúrra
eyelash, madobirma
Face, dárreminndbirra
fallen—thou, he, this fellow has,[4] no-, ber-, go- -áddbin*g*
father, nígan; child addressing, nággeding;[5] my father, nígannbirra; father's brother, bípi
fight—I, he, á-, bér- -ramellíddy*im*
find it, genyúrup; found (*see* catch), gar*i*
finger, gw'iárr*w*oa
finished, bánuk gwílling
fire, gwíanng*w*oa; fire gone out, gwíawínng
firesticks to produce fire, bóllbilli; to use them, wíllam gíllam
fish, múddo*w*a
flesh, búddloa
food, mauma, meiyoma
fool, you, and other terms of vituperation, dinndidáni, dinndáijik, diamy'udáijik

2. Kwárro*w*a mógwe—"This fellow wants a drink of water;" *also*, Golmorra gwinnyi—
Water eat. *Grog sit down.*
"Will this fellow drink his grog?"

3. Banana mogwe—"May I eat the bananas?" Bréddema daddbiénni—"They have
Banana eat. *Bread they have eaten.*
eaten my bread."

4. Agoldum áddbin*g*—"I ran and fell;" Nogoldum *no*addbing—"You ran and fell;"
I ran from fallen. *You ran from fallen.*
Bilájí beráddbing—"He has gone and has fallen;" Biddla bérraddbing—"He is
He has gone, him fallen. *Him hit, him fallen.*
hit and has fallen."

5. Term of endearment, as when an English child throws its arms around its father's neck, and says, "My daddy."

fool, to, *i.e.*, you fool me, nóligum; you lie to me, gonólum gwínnyíram
foot, gwiéllk*w*a
footprint, biralpbirra
forehead, mudpirrma
forget—I, dual, ál-, mú- -lerrinn-ga; I forgot,[1] kwaélla bír*w*'a
four, gállatíllik ánndillik
fresh (water), kunúltoa
frightened, be'ud*kh*yéllming
frog, kúlpúlwa
from, -um
full (from eating), néddlabokk, yunútpi
further,[2] donoe*r*kwi
Get up—you, he, ngi-, bi- -gidjyi; you are getting up (*see* stand), neggogiddyi
get it, néggildum; I have not got it or brought it (*see* catch),[3] *kw*aella gaora
girl, big, báon-ngugolo; little, báonngilla
give to me, to him, án-, bín- -ngok; you give,[4] nagok

1. "No more catch him."

2. Donoe*r*kwi ngigari—"Go on further."
Further you go.

3. Kwárroa gárri—"Get water."
Water catch.

4. Kwárrowa an-ngok—"Give me water;" An-ngagok tobákkwa—"I am about to
Water give. *Me about to be given tobacco.*
have tobacco given me;" It'uma an-ngok ana—"You give yours for mine.'
You give to me I.

given to me, you, dual, him—about to be, án-, ná-, mínn-, b'u- -ngagok
give, I will not, bárbium
go—I, you, he, a-, ngi-, bi- -gári; dual,[5] mogwíri; this fellow go, not to return, goaribing
going or coming,[6] néggarikk
gone—he, they have, bi-, da- -láji; he has been gone,[7] bárabiláji
go back—I, you, he, a-, ni-, bi- -géllibum
go round (also *turn*, as a doorknob), gwindari
good, padj'i; very good, pátch'imilla; goodbye, mámáok
goose, bónnamorra; pigmy goose, lidúnnda
grass, small, meriedlema; tall, máotdlema
greedy, múnnowel
ground, gwialwa
growl, to (*see* adulterer), alennjia, allennjiak
Hair of head, br'úridl*wirra*; of face, kwíabálma; of body, m'áuerma; of abdomen, g'áulma
half, kwéawirra
hand, gw'íarr*wirra*
hasten, gwíllipbikk
he, she, it, him, her, yába; his, hers, biánnage; himself, &c., bimilla
head,[8] mállóma
hear—I, he, al-, ba- -leitong
heavy,[9] m'útki
here, yenn, yénngwa
hill, little, gúmaróka gúlla; big, gólogo gwíllāga

5. Anannga it'uma mogwíri—"I and you go;" Ngigári mogwíri—"You go first, we two
I you two go. You go, two go.
go after;" Agári bigíddjya bigári—"I will go, let him get up and go away;" ananng-a
I go, him get up, him go. I
agari m'ulitúdma mulerippma; agári agalímbgwa——"May I go to the little house, for
I go little little house; I go I urinate.
micturition?" Ngigári big'umm—"Go quickly."
You go, it is being said.

6. Néggarikk mánnagwa—"He (who has fallen behind) will come on by-and-bye;"
You go towards by-and-bye.
Aragwa néggarikk—"Where are you going?" Adnlamilla Máell nèggarikk—"Where is
Where you go? What name Maell go.
Máell going (having departed)?"

7. Dállippbing daláji—"They have cleared out, and gone away;" Gállatillikk maramá-
They are come out, they are gone. Two two
rillikk—"Two have gone away;" Dagárillikk daragwilling—"All have gone away to-
have gone. They are gone, they have been entirely.
gether;" Aragwa moléji—"Which way did we two go?" Arakwa biláji bilira—
Where two gone? Where him gone blackfellows?
"Which way have the blackfellows gone?"

8. Malloma gwíllika—"A big head."
Head big.

9. M'utma m'ulit'udma—"A little heavy."
Heavy little.

hit, shot (*see* stop), bíddla
hold him, duppinnyer
horse, nánntoa
hot—I, you, it is, á-, né-, bér- -rakwírra
how much, argugwínnikk
house, small, ménelürra, m'úleribbma; large, kwónamínngwoa; hut or wurley, máldurébbma
hungry, amúnnding, nigar amúnnding
hurt, are you (*see* ill), nelínnikk; have I hurt you, nawaum
husband, naow'a
I, me, ánanng-a; belongs to me, ánagi; myself, anang-amilla
iguana, kurara
ill, hurt, dying, allínyima; I, you he, they are, a-, ne-, bo-, da- -línyi
inside—you put, this fellow put,[1] no-, go- -gáodta
intestines, namannam*a*nerk
Jabiru bird, dáolduba
jump on back, baramúnnyin
Kangaroo, l'un-ngútpa
kills, hurts, wounds — he, this fellow, they,[2] bi-, go-, da- -gílla
knife, máramári

1. Place in a room or put yourself inside, as, Trautherwa nogoadta—"Put on your
Trousers you put inside.
trousers."

2. Bigil*la* nimmgolólo—"He is beating the lad;" Lárraba bigilla—"He has wounded the
He kills big boy. Old man he kills.
old man."

know, I (*see* hear), álleitong; I do not know (*see* see), banbaoning, banmaoning
Laugh—I, you, this fellow, they, a-, nel-, gwi*a*l-, dal- -lamáoggi; a big mocking laugh,[3] bókkung gwillāgi
laughing-jackass bird, l'ánurba
lazy,[4] múmo-ing
leg, dáonda
let me, him (allow), an-, bin- -ngolda
lie down, I, anannga nakkgaert
liar, kwinnyiram
lift it, bíddbíddla; lift this fellow (*see* stand), g'ógíddla
light of day, lallirirkgwa; of fire, bokulktji; light it,[5] bokwínnida
lightning, leaurba
like, relish, bidjalippmerk; distasteful, dúkkwa
like, affection (*see* hear), b'udbaléitmaong; I like you, you like me, al-, nel- -léitmung
like, similar, nog*w*um
listen, inna
little, m'ülit'il, mūlāge, m'ülitudma; little fellow,[6] gúmilla
lives, he, bimedip
lizard, small light, kumúngwa; small darker, lurabella; frill, dáddlwirra
long ago, kwillimigérrgwa, ? allokwa, ? aragwegum
long way, a, dírriwa
look out! (*see* see), gwin-gánna
louse, lamilla
Make, modlum; this fellow make it, gaodlum; I can make it,[7] ana maotbudbing; make it right or proper,[8] agg'aganmidjing
mankind, biába, birok
man, young, bállia; married, móllinyu; old, lárriba
many, binnólka, birammbirra; many people, kwarrabarokk
marks, I make, méndirramúggi
mate, addressed as, mídir
moon, láurua
more, do some (*see* another), gallagwa
mosquito, lámtda
mother, álgan; my mother, álganbirra; addressed by son, kwoding; by daughter, nemabirra; mother's brother, únyi
mouth, gwea*r*baulk*w*oa, gwerba
move farther away, yútkwa, yútkeri
Nail of finger and toe, daalla
name,[1] neana
native-companion bird, doluba
near, 'ippóro
neck, gúmudaopgwa
night, dark, dlamaongwa
no, no more, not any, kwaélla
no (do not want it), kwíaok
nose, kwíángwa
nosepin, dlemél*w*i*r*a
now (to-day), illángwa
One, kállaguk
open, tdádtman
opossum, kw'aotkita
orphan, fatherless, báonári; motherless, mundálling; either addressed as, bómbilla
ours, dórennáge
outside,[3] nakk, nakkjin
Pairs, to place in, kwimítlik
palm, an edible, kwillimmba
parrot, blue mountain, willrílma

3. Anal*la* gwíallamuggi—"What do you laugh for?"
What for laugh.
4. Illangwa múmo-ing—"He is too lazy now."
Now lazy.
5. Erribókwa an-ngok—"Give me a light."
Light give me.
6. Nimmbirra m'úlit'údma—"Very little children."
Children small.
7. Káppbirra bimódlum—"Is he to make me a cap?"
Cap him make.
8. Trautherwa ag'aganmidjing—"Make my trousers right" (tighten them at the waist). *Trousers me make right.*

1. Neána ádnlamilla—"What is your name?" It'uma enáma néddle—"What is your boy called?"
Name what is itself? *You name your boy.*
2. Tdádman nákkuk miáldama—"Open the door;" Lemúrra dadman—"Look."
Open outside door. *Eye open.*
3. Balallwilwa winnúlma—"Throw it outside?
The middle one throw it away.

perhaps, g'ognáogh
pick it up,[4] morenjim
pinch, áragiki
play, gulamuggi, ílomai, gulomai; children's games, as hide-and-seek, agarut; hide, whistle, and spy, dadwiln'ídung; hold with hands and with legs round waist and fall back, áredbingmung; pushing one another over, daminaji
plenty, gotuk, baratuk, mamóia
pregnant, méloa
pud. hominis, dúbirra, dórkh'ing; mulieris, dínnda
pull off (*see* throw),[5] winnúlla
put it down—I have, anam'ái; this fellow has, gug'ái; put it up there, gwídjinidaong
put on (*see* inside),[6] g'údta
Quickly, hasten, kwillipbik

4. Arenji ¡bigár—"I pick up (the ball) and catch it."
I pick up him catch.
5. Tráuthera winnuúlla "Pull off my trousers."
Trousers pull off.
6. Aragwa nog'údjo—"Which way do I put it on?" Ngigári buminnyi—"You go and put it away.
Which way you put on? *You go him sit down.*

quiver, of the limbs in the corroborie, mútmir
Rain, báolmba
ready, are you, barabiddji
ribs, marúlma
ride, bibíddmi
river, kwi'alíggwa
rock to and fro, as a baby to sleep, gugumedla
run, múddli; towards me, from me, nógóld- -erk, -um; dual run,[1] mógoldáriji
Say—I, you, he, a-, ne-, bi- -g'úm; to him, to this fellow, bi-, go- -nímbirra; he has said, bárag'úm; he said, bog'um; he is, two are talking, bín-, mán- -g'am; a general talk,[2] gógog'úmbirra
scratch, mutterum
sea (?), kunimíddyénderroa
season, the wet, gwonáreawang
see, báoning, mamann, bannaning, mamanning; seen him, binnging; I have seen,[3] áragobáoning
sharp, as scissors, birúnnki
short-fellow—he, this fellow is, bín-, gón- -nopóllera
shoulder, dáramínndillera; shoulder-blade, mínnikillma
show me, you, nágalítda
shut, méittnamílli
sick, vomit, kumenan
silent, be, gaop; silence! (emphatic), kapp nig'am[4]
sinew, vein, dáonera
sing, gulwagemullam
sister, elder, ánmerk; younger, núllw'ok
sit—you, he, dual, ne-, bi-, mo- -gw'inyi; he is, they are sitting,[5] bén-, den- -yin
sleep—you, he, no-, ber- -ramedjin;

1. Nogoldogol—"You run there and run back;" Nakkjin nógoldo—"Run outside."
Outside you run.
2. "No," nég'um binimmbirra neg'ínnyi—"Say 'No,' and tell him to sit down;"
No you say him tell you sit down.
Beritt bog'um—"He says 'Turn.'"
'Turn,' he says.
3. Kwaélla báona—"I do not see it;" Anyólde magáono—"Let me see, too Anyólde
No more see. *Let me dual see* *Let me*
bigwaoning—"Let me have it to see;" Anyold gogwáono—"Let this fellow see;" Baoning
see it. *Let me this fellow see.* *See*
monólkoa—"I see them all about (I see a big mob);" Nemáng-wa magáono—"A revoir;"
all about. *To-morrow two see.*
Arbirra binnging—"Who saw him" Anall ánnyam—"What do you look at me for?"
Who him saw? *What see?*
Angwaon gwérrip—"I fear to see him (the superstition 'evil eye'—'him frightened Eyes'
See this fellow into.
was the interpretation given me)."
4. "You say a silence."
5. Gwan mog'ínnyi *and* Gwinn mogw'ínndi—"Let us two sit here;" It'uma anang-a
There two sit. *Here two sit.* *You I*
mogwándi—"Will you and I live here?" Aragwa nenáni—"Where do you reside?"
two sit down. *Where you sit down?*

you, he has been asleep,[6] nora-, ban- -medjíni
slowly, go, manoi
smoke, a, kwiígwa; a big smoke, meréidlya; to make a smoke, b'udawíllawáollam
smoking, bongbong; to smoke,[7] gógoma
snake, black, daarla; brown, lemirdla; yellow, lamálla; spotted, kwarilla; a small, kwiungulloa; a dreaded poisonous, móromorludyi
son, némérk; son's son, nólyo
sores, gubengoa
spear, jag, mállag'irmá; jagged both sides, ménauilídma; stone, daúinga; reed with point, lúerba; reed without point, g'wirinnda *or* gríinnda
spirit, ghost, portrait, darabóllera
spittle, bilírema; I must spit, meramínnma; to spit phlegm, tokh neg'am

6. Agol médjim—"I shall go to sleep quickly;" Nógol medji *and* Ngigári nógol médji—
I run sleep. *You run sleep.* *You go you run sleep.*
"Go to sleep;" Mogwíri medjim—"We two go to sleep;" Aolmédjimuk—"I am sleepy;"
Two go sleep. *I sleep towards.*
Alladíka beláji berramédjim—"He is going to live at home for awhile;" Aragwa medjia
Wife him gone, him sleep. *Where sleep*
—"Where will you sleep?"
7. An-ngok gógoma—"Give me a smoke (from your pipe)."
Me give smoke.

stand, you, negíddyi; standing up,[1] kolknari
star, mámúdlema
steal, guúllibik
stone, damilla
stop—I, you, a-, ne- -g'áo; you, he stay,[2] neddli, biddli; leave off (*see* enough), bánuk
stretch oneself (*see* ill), allínnying; to stretch one's leg, dh'uethth'uel
strong, hard, difficult, dánkal; strong fellow, gwíllagowang; make it strong, negódpingi
sun, lállirra
sweat, kwillúkerra
sweet, dádbon
swim, wálaragum
Take it, you, nágukka; he, this fellow take it, bín-, go- -nukka; take out,[3] magólla, gomólla, boólla (*or* boára, goára)
tea, yabárak
tears, guloa
teeth,[4] dlenb'érkgwe
tell them—I do not want to (*see* say), báragummúggi
testicles, gwiyúwunngwa
thank you, monkáini
that one, yedbirra
that side *or* that way[5], yágolak, yagolágwa
there,[6] yagwa, yagbirra, yenn
this fellow, amilla
this one,[7] gwinnbirra
this side *or* this way,[8] gwinn, gwáonika

1. Kolk agar giddyi—"I stand up;" Kolk ngigar giddyi—"You stand up."
Up I go lift. *Up you go lift.*
2. Neg'ao—"Stop (walking or other action);" Adnla néddle ngigári—"Why do yo
What you stay? you go.
stay there? Be off;" Arak biddle—"Where did it (the ball) stop?"
Where him stay?
3. Banjóllop *and* millbóllom gollop—"He does not want to take him;" Trautherwa
Trousers
gogwolla—"May I take off my trousers?" B'útpolla padj'i—"I will take up a good one;"
this fellow take away. *Him take good.*
Goara bilaji—"He has taken it;" Nákk bimukk binnulla—"He has taken
This fellow taken, it is gone. *Outside him take, him throw away.*
it out to throw away."
4. Dlenb'érrginum allinnyam—"Toothache."
Tooth ill.
5. Yákk goláji—"This fellow has gone that way;" Gwan mogwíri—"We two go that
That way this fellow has gone. *That way two go.*
way."
6. Yún nelaji—"Have you been there?"
There you gone.
7. Gwinnbirra gwinnbirra gwinnbirra gwinn—"This one, &c., this" (enumerating).
8. Gwinn golaji—"Go this way, eh? (having turned off);" Gwinn gwíllákwa—"This
This way this fellow gone. *This way big.*
long side (of the table)."

thigh, múkka
thou, it'uma, adáma[9]
three, gállatillik kállaguk
throat, mangolma
throwing-stick for spear, biláta; for reed spear, billilma
throw it away, agaribob, binnúlma; throw it, this fellow away, bo-, go--ara; I have thrown this fellow, both away,[10] go-, muo- -lomang
thunder, molne; thunderstorm, bierrówa
tickle, bérribíddbirra
tired, ánnélling; a cry of weariness or pain, árrgai...
to - day, illáng-wa; to - morrow, nemang-wa; day after to-morrow, nemann kállaguk
toe, kwiéllgwa
together (*see* pair, to), millik
tongue, kwiaméddloa
too,[9] garra

9. The softer intonation, "adáma," is heard in tones of tenderness, as a boy being with another whom he is loth to leave says "I go," adding "adáma garra" (you too), wistful that his mate should accompany him.

10. It'uma binnúlma—"You throw it away."
You him throw.

truly, gáodloa
turn it,[1] beritt
two, gállatillik
Up, above, on top, kolkoa
urinate—I, you, agga-, noar--limmb-gwa
Vent, gum'úlwa; from it to bladder (*see* carry), biáttbirra
Wait, I, ádelaong
wake him—you, negíllmi
wash myself, bathe, áramannbitt-jium; I wash myself, you yourself, ára-, nólo- -mánnbiddji; I wash the clothes,[2] gugumanndub
water,[3] kwáorrowa
wax, in ear, bonórroa
we, dorendbirra; dual, moanmilla
what, analla; what name,[4] adnla-milla
when, 'árgwigám
where, which way, áragwa
whistle, you,[5] will nég'um, willwill nóg'um, willwill rogum
white, clean, árkhngarr
whitefellow, arkhngarramilla
who, which one, árbirra; whose, árbidénnagi
why for, why not,[6] 'arbíddla
widow, widower, bénnbirria
wife, álladik
wind, múnmúnma
wish, want, amalla
womankind, múellabirra
woman, with children, búnbena; old, g'umul
work, I[7] (*see* make), ágg'aganmidji
wrist, mobírma
write (*see* marks), méndirramúggi
Yam, pulida
yes, I assent, g'ogógwe, g'o
yesterday, kwodláogwa
you, (*sing.*) it'úma; yours, itennage

1. Beritt nogo'itji beritt n'egum—"Turn to the right, turn to the left;" Beriddma nongya?
Turn ? right, turn ? left. Turn ?
—"Turn over;" Berittbing gogomang—"Turn, smoke (reference to forming camp)."

2. Ngigári nolomannbiddji, gállagewirra gungwa biginnyi plátbine gománndop
You go, you wash yourself, another fellow here him sit down plates wash.
Lemálagwa bigári opligkwa beggaganmiddji—"You go and wash yourself, the other
Lemalagwa him go office him make proper.
fellow stay here and wash the plates; Lemalagwa will go to the office and work."

3. Kunult gári gwárroa—"Fetch cold water;" Kwáorroa gwilla bidding—"The water
Fresh catch water Water all fall down.
has all leaked away;" Kórroa gwaélla negwilling—"You have drunk all the water.'
Water no more entirely

4. "What is it? What do I do?" Analla ngigári—"What am I to fetch
What for you go?

5. "Whistle, you say." Will bárag'úm—"Somebody whistled.
A whistle has been said

6. Arbíddla beg'ao—"Why does he not stop?"
Why for stop?

WULNAR.

Most of the words known to me are included in the vocabularies compiled by Mr. W. O. Bennett and Mr. A. J. Todd, and are therefore not reproduced here.

Afternoon, melíter
animal, monulyáner
Bag, owei
big, miyángyer
bird, loaga
breast, woman's, gumúnnya
brother, younger, uíta; elder, núllar; my, nulladbunna
Cold, oppógwi
cough, mamurrda
Dark, dlamungwar
day, irning-a
Enough, bíléiya
Fight, wauikattpi
finger, téliámunger
fire you light, leitonga b'ukonwa
Give me, gunmítja
good, nódla
Hair of head, lerrmālner; of face, yāber
hand, mani
husband, lainelónggunya
Ill, āngeaga
insect, moromorā
Mankind, kumaol
many, miapunger
milk, ngoiyer
Navel, lemala
No, kwoddlégo; I do not want, liítter
Open the door, daddmanakwa mogwianagwa
Pelican, yuropiter
pud. hominis, mung-ai
Run to me, mokwel; from me, murbiokwel
Silence, you say a, kupp ninnmi
sister, younger (*see* brother), uíta; elder, nelámi
smoke, lenlátimima
stopped, he has, witjunga
Thigh, wonóga
throw it away, linnánnmittiger
tired, ínnmókattar
tongue, wiiyer
Wake him, lemorr
womankind, mungedmitta

AWARRA

Alligator, bíra
ankle, ann-gro, annmo
ant, little common, bim; yellow, woallum; red, bom
arm, ann-goronng
armlet, dáman
Bad, allwarra
bandicoot, yok
basket, dul
before, bulgmarra; you go on before, yággma bellajin
behind—come on, lura kolajin
belly, anndoyi
belongs to old man, agallawo dattpulla
belt, darabert
birth-delivery, bin-ginyan
blackfellows, nalmok
blood, kuraj
bone, annmau
boy, little, állil; addressed as, warraba; big, auwirra
breast, woman's (*also* milk), d'utut
brother, my, boppa
Calf of leg, annbuin
club, sharp-edged, warawara; blunt, dukkara
cold, allal
come—you, yann; ye,[1] biann
cough, gúlaba
crocodile, maimakko
cuts (cicatrices), darawumerring
Dead, bajum
dog, little, ng'iri
Ear, ann-gónnem
elbow, annkónmo
emu, mórin
empty, made, addwilling
enough, amóge
excrement, gudma
eye, ánndum; eyebrow, anndumónndi
Father, bibi
find it, wādo gunya; I have found it, áddnai
fire, verk
firesticks to produce fire, gwélgma to use them, vagmo
food, moiya
fool, to, múnualgwínn

1. Móann yann—"You come on."

foot, ánn-goba; footprint, annborra
forehead, annwálma
frog, jakkun
Girl, baby, állmárramáring; crawling, albupáddma; little, pfótátta
give me,[2] bano
go, ya; he has gone, kaiinnye
goodbye, mamok
good, ammokwao
gum, ironbark, yilyil
Hair of head, mída, annmār; of face, kéttawerk; of abdomen, tólmida
hand, annábi
head, annbon
hill, gíri
hungry, uyung[3]
I, me, nàk
Jabiru, gw'ael
jaw, anndómkok
Kangaroo, kupu
Lips, únnduli
lizard, kúnnimbullo
Man, young, dulᵘgwin; married, bumbiligo; old, dáttpulla
micturition, waol
moon, karrong
mosquito, nael
mother, warra; my mother, bulbil
Name, what, yemín-gi
navel, ánnlánnjérruk
no, wado, waggi; not yet, mutto-waggi; no more, amalla
nose, annji
Opossum, uoda
Pregnant, moleru
pud. hominis, unnleng, lánnkubenning; mulieris, ual
Quick, hasten,[1] lukluk
Shoulder, annmónukk
sit, pfaddminninni; dual sit, gallem galboninni
sleep, maiyuol; I want to sleep, maio m'ai'i
smoke, to, dúbbomélwon, dubbomi
snake, bellum; water, gunda; brown, báonobaon
sore, bigmi
spear, boko, kówonóro; jag, toltol; jag two sides, méddobálli; stone, lauk; reed, dárin
sun, míral
swim, marrimmar
Talk, mattgo-inge; tell him, kaji, kaji jai
teeth, aliddma
testicles, annmuɛth
thigh, ánndarato, annmullok
throw it away, laggin; thrown away,[2] addlaggin
throwing-stick, don; for reed spear, gírikk
thunder, kóddaduᵘidma; thunderstorm, dúrídmin
tomahawk, dodol
tongue, únnjenn
Walk, main; you and I, geironga main
water, wik; drink, wik mábel
way, that, inndubba
what, ábo-in
where, umbulla bajim
woman, old, imbillalgo; young, addressed as, allamándúba
Yes, yo
you (*sing.*), móann

2. Wik bano—"Give me water."
1. Lukluk bian—"Come on, quick."
2. Wik bilággin—"Throw away the water."

AGGRAKUNDI.

Arm, ajinn
armlet, mamal
Bad, yoyo
bag, dul
belly, margill
blood, gulminn
boy, baby, innbarro; little, ambut; addressed as, túmbitúmbi; big, dárraggit
breast, woman's (*also* milk), ying
brother, boppa
bush, the, bunndi
Calf of leg, ann-gorro
come—you, yann; ye, biann
cousin, nawong
crocodile, genult
cry, ra-i
cuts (cicatrices), biling
Dead, nulgmɛung
dog, yiri
Ear (*also* toe), adálpi
empty, unwilleing
eye, mibull
eyebrow, marluk
Father, awarrago
firesticks, to produce fire, gibei
food, moiyi
foot, amul
Girl, anmodalpa; baby, immálwulk
give me, anmo; I give, bano

go, yak
goodbye,[1] mamaok
Hair of head, mannmār; of face, keddóark
hand, annmoa, abill
head, immbun
hill, garaui
house, small, maiwa
I, me, arraman
Jaw, adámkill
Kangaroo, taning
Laugh, gommenn-gommenn; dual, mogábbinn; they, múgga-mug-gámminn
lizard, small light, mungbéllma; small dark, bónjimm
Man, young, deinmulva
moon, kommil
mosquito, kimmiel
mother, innarrago
mouth, unnyulk
Name, naban
no, kwaella, wagge
nose, agginngelk; nosepeg, gegung
One, udérinn
Opossum, dinng-a
Plenty, wiomopo
pud. hominis, darr, abigelloduk
Quick, warri; come on quickly, allauklauk bian
Run to me, marimari
Shoulder, abelma
sister, mulginn
sit, annínni; you sit, móan annínni; dual, manninni
sleep, aréiyi, máiyi
smoke, I, ámitúbbimi
snake, grass, bann; water, móballágo
spear, stone, kondóbum; reed, láimo
stop, daonok
sun, mawarrik
swim, marbírrami
Teeth, aiímmerríkk
testicles, taiimmell
thigh, abell
throwing-stick for reed spear, dírik
toe (*also* ear), adálpe
Walk,[2] yiark
water, yik
way, a long, malwalk
what, abbon
You (*sing.*), moan

1. Mamok yawarra—"Good-bye, I shall come back."
2. Warri (*or* waggi) arra yiark—"I do not want to walk more."

NATIVES OF THE KATHARINE.

(Contributed by Mr. E. J. Kemp, of Glenelg).

Alligator, dāgul
All right, I am, laguit
ant, common, cheāk; white, kārablungul
apron, man's fringe, jolgon; woman's, ungoruk
arm, murnuk
armlet, willa
Back, the, ngolo
bag, dilly, miyauk
bamboo trumpet, kurnbug
bandicoot, yawk
barramundi fish, mardbing
beard, ngāruk
belly, ngoldāg; full, wei; empty, gugmarin
belt, braak
billabong, nglanga
blind, tumeā
blood, kurak
bone, unmoa
boy, little, megulgul
breast, woman's (*also* milk), gawn
brother, unbuba
Camp, numbura
catfish, chalo
cockatoo, white, ngaruk; black, kāruk; tail feathers of black, didjualla
come back, goyai
crow, yi
cry, dollumun
Daybreak, ungulāra
dog, wild (dingo), wāruk
duck, tilbiuk
Eye, undum
Father, tchardba
fire, wuruk
fish, mardigal
fly, house, morok
foot, undjora
Girl, little, ulwān
go quickly, ngorra-ngorra
go, you, ungān; you and I, negannguilo
good, nglāgamura
good-bye, munjungāla
ground, hard, bawl gumma-gumma

hair, bāmjuruk
hand, bārāk
head, mengalap
how are you, ngulāwūl yūgūna
Jabiru, paunóru
Kangaroo, kupu
knee, umbārt
Laugh, yeaumun
leg, ungarra
leave it, ponga
lip, ngālk
lizard, yang
Man, kingulpoya; old (*also* woman), tholba-tholba
mine, nāgulung; this belongs to me, ngāgulu wārre
mosquito, beundo
mopoke bird, gogulporuk
mountain range, bāran ngire
moon, deāt
mother, kārung
Nails, unbillum
night, gullaruk
nose, gamul; nose stick, maruk
Opossum, wirik
Quail, jirik
Rain, wāāk
river, unboa, ngugmāri
Sandfly, ngāla
sick, I am very, kulwutma
sister, dinda
smoke, undumugma
spear, bogo
stone, pāāt
sun, giguil
swordfish, chulwul
Teeth, nglaidmor
tomahawk, mardi
tree, laianth
turkey, beinuk
What is that, guliānā
whistle, wirdmun
woman, old (*see* man), tholba-tholba

Descriptions of New or Little-known Species of Blattariæ, Gryllacridæ, and Stenopelmatidæ collected at Lake Callabonna, S.A.

By J. G. O. Tepper, F.L.S.

[Read November 6, 1894.]

The various forms of Orthopterous insects which form the subject of these notes were collected by Mr. A. Zietz during the latter half of 1893, at Lake Callabonna, as bye-work whilst engaged there in the exhumation of Diprotodon and other fossil remains. The specimens referred to form part of the entomological collection in the South Australian Museum.

SECTION BLATTARIÆ.

FAMILY PHYLLODROMIDÆ.

Phyllodromia magna, *spec. nov.*

Ochreous testaceous; head only *slightly* prominent, face with a broad blackish band between the bases of the eyes; antennæ blackish, basal joints pale; pronotum slightly *wider than long*, *emarginate in front*, with two broad straight black stripes, wider behind (*not* curved), space between them of the *same* color as the margins and the elytra; elytra concolorous (wings not observed), veins dark, branches parallel, only divergent at the base; legs pale, concolorous; abdomen above banded with black, ventral segments each with an intramarginal black spot; cerci blackish, banded pale; subgenital lamina broad, rotundate, with a short dark oblique streak on each side, and a blackish dot near the apex.

	Female.
Length of body	21 mm.
Length of elytra	22 "
Length of pronotum	3·5 "
Width of pronotum	4 "

The single specimen obtained appears to resemble *P. Germanica*, L., but is much larger, the pronotum less transverse, the black stripes of unequal width, and the anterior margin distinctly emarginate; whilst the branches of the radial vein of the elytra only diverge at the base, being otherwise parallel throughout.

The abdomen also is differently marked. This species appears to be the largest hitherto described.

PARATEMNOPTERYX ZIETZII, *spec. nov.*

Brown to blackish, paler below, shining; head free, an ill-defined, narrow, curved black bar between the eyes; *ocelliform spots obsolete;* clypeus pale, basal area of the antennæ whitish, latter very slender, as long as the body, pale brown. Pronotum elliptical, margins very narrow, disk more or less distinctly excavated, anlges rounded, hindmargin straight. Elytra nearly *quadrangular* veins distinct, raised, scarcely *exceeding the first abdominal segment.* Wings rudimentary. Legs uniformly pale brown, fore femora crowdedly spinose, all more or less ciliate (tarsi without arolia). Abdomen with dorsal segments finely scabrous along the hind margins, angles not produced, except those of last segment. Ventral segments brown to black, shining. Supra-anal lamina *longer than wide,* subtrigonal, *posterior third incurved,* apex rounded. Cerci very long, acute. Subgenital lamina very large, cucullate, hindmargin entire, bearing the short, suberect styles; latter black above, pale beneath.

	Adult males.	Male and female larvæ.
Length of body ...	18 –19 mm.	13–15 mm.
Length of elytra ...	4 – 5 "	—
Length of pronotum	4·5– 4·8 "	3–3·5 "
Width of pronotum	6 – 6·5 "	4–5 "

There are two full-grown males and three larvæ, one of them apparently a female. The species is distinguished from *P. australe,* Sauss., by its larger size, absence of ocelliform spots, much shorter elytra, and the peculiar form of its anal appendages. The larvæ are much darker, inclining to black. The vertex of the head is paler than the very dark face.

FAMILY PERISPHAERIDÆ.

LEPIDOPHORA, *gen. nov.*

Resembling *Perisphaeria glomeris,* Sauss., in aspect. Body convex, elongate, stout. Anterior angles of dorsal segments produced laterally as a subtrigonal scale overlapping imbricately the respective ventral segments at their base. Supra-anal lamina quadrate, posterior angles produced as short spines. Subgenital lamina subtrigonal, apex produced, forming two conspicuously diverging spines. Styles slender, as long or longer than the lamina.

The scale-like appendages along the lateral ventral margin, to which the name refers, are apparently a novel character among

the Blattariæ, as I have hitherto not observed it myself, and I am unacquainted with any reference thereto either by description or figure in the literature available. Similarly the form assumed by the subgenital lamina is quite unusual. These features justify therefore, I think, the establishment of a new genus for the species, which for the present at least is located among the Perisphæridæ, to which in general aspect it appears to fit best, but it may require, when better known, to be removed elsewhere.

LEPIDOPHORA FURCATA, *spec. nov.*

Black, finely rugulose, wingless. Body much curved. Head concealed, glossy; vertex and face reddish-piceous; sides, fore-margin of clypeus, and trophi pale testaceous. Antennæ much shorter than the pronotum, slender, reddish. Eyes irregularly reniform or wedge-shaped. Pronotum elliptical, margin narrow, not much reflexed, laterally incrassated, less so in front, arched; hindmargin concave, angles subacute. Meso- and metanotum similar. Abdomen dorsally almost smooth, hindmargin of segments with minute raised points, straight, rectangular laterally, angles of the seventh segment produced as a short red spine; beneath piceous laterally, disk reddish, penultimate ventral segment narrow, reddish. Legs rather short; internal spines of fore femora short, crowded, very numerous, external ones longer, few, and distant. Coxæ pale testaceous, base piceous, remainder reddish. Tarsi long, beneath dilated, whitish. Supra-anal lamina with hindmargin ciliate, pale reddish. Cerci lanceolate acute, longer than the lamina, dark red. Styles reddish.

	Male.
Length of body...	24 mm.
Length of pronotum	6·6 "
Width of pronotum	10·5 "

A single male was obtained, but I have since got another from elsewhere. The specific name refers to the peculiar form of the supra-anal appendage.

SECTION LOCUSTODEA.

FAMILY GRYLLACRIDÆ.

EONIUS CALLABONNENSIS, *spec. nov.*

Resembling *E. tigrinus*, mihi (Trans. Roy. Soc. S.A., XV., 163), paler. Vertex and front of the head pale, clouded darker; apex of mandibles obliquely truncate, toothed, *deep black*. Pronotum with the fore and hindmargin each slightly marked with a blackish band, longer than in the allied species. Elytra ovate, slightly extending beyond the hindmargin of the meta-

notum, veins distinct. Wing-lobes rudimentary, concealed by the elytra. Hind femora with *six pairs* of small spines. Hind tibiæ with four to six external and six to eight internal spines, all black at the apex. Femora near apex, and all the tibiæ and tarsi, hirsute, like *E. tigrinus* (omitted to state in monograph). Ovipositor *very slender* and long, nearly straight, acute, apex black.

	Female.
Length of body	36 –37 mm.
Length of elytra	5 5– 6 "
Length of pronotum	7 – 8 "
Length of hind femora	19 –20 "
Length of ovipositor	43 –48 "

The two specimens obtained differ principally from *E. tigrinus* (independently of color and size) in the black, toothed apex of the mandibles, almost concolorous pronotum, much longer elytra, different arrangement and size of spines, and the more slender ovipositor; from *E. atrofrons* and *E. fumatus* in much larger size, pale head, and number, &c., of spines.

The ova were extracted from both the specimens, and proved to be nearly mature, in the one more so than in the other. One yielded 47, the other 24, a small proportion were only about half-grown. The mature ones were brown, elongate elliptical, 5–5·5 mm. in length, somewhat thicker on one end than the other, each terminating with a circular, smooth, shining, darker lid, the intermediate portion being ornamented with crowded microscopical papilla, arranged in regular diagonals. The small, immature (or male ?) ova are almost cylindrical.

Eonius atrofrons, *Tepper* (Trans. Roy. Soc. S.A., XV., p. 164).

Two specimens were secured, viz., a nearly mature male nymph (the first example of this sex for the genus) and a female larva. As the species was originally established from a single female, these not only confirm its validity, but the former supplements the generic description, hence a full description becomes necessary.

Male (nymph) similar to female, but considerably smaller. Abdominal segments 8 and 9 almost concolorous; hindmargin of the latter straight, angles lobe-like produced. Supra-anal lamina transverse, divided by four furrows into five unequal parts, the central sulcus produced posteriorly as a dilated rotundate lobe, and longer than the basal part. Cerci very short, apex blackish. Subgenital lamina small, subquadrangular, rather longer than wide, simple. Styles minute.

	Male.	Fem. larva.
Length of body ...	21·5 mm.	18 mm.
Length of pronotum ...	4 "	3 "
Length of elytra ...	2 " (rud.)	—
Length of hind femora	10 "	8 "

The black face is so conspicuously characteristic of the species that it scarcely can be mistaken for any other yet known. The ovipositor of the female larva is scarcely conspicuous.

FAMILY STENOPELMATIDÆ.

PENTHOPLOPHORA DRIFFIELDI, *Tepper* (Trans. Roy. Soc. S.A., XV., p. 175).

Of this species fifteen specimens were obtained, viz., six adult and four larval males, and one adult and four larval females, the larvæ representing various ages, the youngest being only 9 mm. in length, while the oldest is almost full grown, but presents the ovipositor still in its recurved position, and much abbreviated. This being the first instance of males having been secured, the description is added.

Male. Similar to female, somewhat smaller, paler, and the markings less defined. Abdomen with the eighth segment cucullate, hindmargin sinuate, angles and middle slightly produced, rotundate, concave parts with numerous, minute, dark-brown toothlets; the ninth segment only exposed posteriorly, contracted, trigonal, apex broadly rotundate, disk on each side with a conical protuberance surrounded by a depression, its apex formed by a small, blackish, outwardly curved acute spine, from which extends laterally a short blackish ridge. Cerci short, slender, hirsute, pale. Last ventral segment of abdomen transverse, hind margin very sinuate, middle much produced with two short, thick, obtuse, blackish spines near apex. Styles short, glabrous, apex blackish.

	Adult.	Larvæ.
Length of body (Male)	30–40 mm.	9 –26 mm.
Length of pronotum ...	5– 6 "	1·5– 4 "
Width of pronotum ...	8– 9 "	2 – 6 "

The considerable difference in length is most probably largely due to unequal contraction after death while immersed in alcohol, through which also the color has been considerably affected.

The dark bands are caused by a pigment, so loosely deposited upon the thin translucent integument, that it becomes detached when one attempts to remove the intestines, no matter how carefully. This may serve as a hint for recipients of spirit specimens, or fresh ones as well, who may attempt the operation. If the specimens have been preserved in weak spirit, I find it best to

immerse them in strong spirit for a sufficient time to harden them; then mount quickly, as most of them when drying rapidly retain their shapes fairly well.

These insects, as stated by Mr. A. Zietz, inhabit (singly) burrows excavated by themselves in sandy parts of the lake basin. They are perfectly circular in form, about three-quarters of an inch in diameter, twelve to eighteen inches deep, and at the bottom somewhat dilated so as to allow the inhabitant to turn round easily. Where the sand is dry, *i.e.*, the upper part of the shaft, the grains on its surface are securely fixed by some cement. Around the mouth a mound, an inch or more, raises the entrance by so much above the general surface, and is sloping outwardly. The pellets of excavated soil are carried by the insect to a distance of six to nine inches from the entrance, and disposed there in a regular circle. When a grass stalk is first pushed into the hole, the insect comes up to ascertain the cause of disturbance, and then withdraws, and will not come up again. When dug out, they refuse to fly from their foe, but will resolutely face him, whatever way he turn, standing on the defensive, and move rather towards him than otherwise.

On some Important Reactions of Double Cyanides bearing upon the Cyanide process for the Extraction of Gold.

By G. A. Goyder.

[Read December 3, 1894.

While endeavoring to find an accurate process for the quantitative determination of simple cyanide of potassium in solutions containing also double cyanides, such as the sump liquors obtaining in the McArthur-Forrest process for extracting gold, I found that cyanide of potassium was alkaline to phenol phthaleïn, and that the quantity of alkaline cyanide present could be accurately determined, in the absence of caustic alkalies and alkaline carbonates, by titrating with acid, using phenol phthaleïn as indicator. The presence of bicarbonates makes the end reaction more uncertain, but by adopting special precautions accurate results may still be obtained. The double salt zinc potassium cyanide is quite neutral to phenol phthaleïn. I am further investigating this reaction with the object mentioned above.

It appears to be generally believed that such double salts as zinc potassium cyanide in aqueous solution have no solvent action on gold. I have, however, found by experiment that this double cyanide readily dissolves gold, although the action is slower than that of the simple alkaline cyanides. When a solution of zinc potassium cyanide is shaken with gold-leaf in the presence of oxygen, or air, the gold is dissolved, forming gold potassium cyanide, while zinc is deposited as oxide. A secondary reaction also takes place, involving the formation of the auricyanides of zinc and of potassium, the former of which appears to be insoluble, and of zincate of potash. Copper potassium cyanide also dissolves gold, although the action is still slower than that of the zinc double salt. It is hardly necessary to point out that the above reactions may be of considerable importance in the McArthur-Forrest process.

In order to determine the total cyanogen in sump liquors I have devised the following modification of Rose & Finkener's process:—A measured quantity of the liquor is heated on the water bath, or gently boiled, for 20 minutes with excess of oxide of mercury with occasional agitation, filtered and washed. To the filtrate about one gram. of caustic soda is added and excess

of sulphuretted hydrogen water to precipitate the mercury. After being well shaken, filtration not being necessary at this point, excess of carbonate of bismuth is added to precipitate the residual sulphuretted hydrogen, well shaken, filtered and washed, and the filtrate titrated with silver nitrate after the addition of a little potassium iodide to sharpen the end reaction which is indicated by a faint permanent opalescence. One molecule of silver nitrate used indicates two molecules of cyanogen present.

Further Notes on Australian Coleoptera, with Descriptions of New Genera and Species.

By the Rev. T. Blackburn, B.A.

[Read April 8, 1895.]

XVII.

CARABIDÆ.

An important and very able memoir by Mr. T. G. Sloane on Australian *Carabidæ* appears in the recently published Part (III., 1895) of the Proceedings of the Linnean Society of New South Wales. Some of Mr. Sloane's proposals—*e.g.*, the merging of the *Morionides* and *Trigonotomides* in the *Feroniides*, and of *Notonomus* and *Sarticus* in *Pterostichus*,* while *Loxandrus Prosopogmus*, &c., are treated as genera—certainly appears to me on first thoughts open to much objection; neither can I acquiesce in Mr. Sloane's apparent reluctance to regard sexual characters as of classificatory value (illustrated by his uniting *Nurus* and *Homalosoma* on the ground that they do not seem to differ except in respect of sexual tarsal characters). As however the memoir was published in Sydney only a week ago, I have not had time to do more than hastily run my eyes over it and am not justified in seriously criticising it on the strength of so slight an acquaintance with its contents, nor should I have discussed it on this occasion if it had not been that Mr. Sloane refers here and there to what I have myself written concerning some Australian *Carabidæ* and in at least one instance seems to invite further information from me which this seems a good opportunity to furnish.

In dealing with *Leptopodus*, Chaud., Mr. Sloane refers to my having expressed the opinion that it is scarcely distinct from *Simodontus* on the strength of its having been formed for the reception of *Pterostichus holomelanus*, Germ., but thinks that (although he agrees *P. holomelanus* is a *Simodontus*, yet) inasmuch as M. Chaudoir attributed also other species to *Leptopodus* some of which stood in need of a new name *holomelanus* ought to be relegated to *Simodontus* and *Leptopodus* retained for other species. I think Mr. Sloane is right in this view of the matter.

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* I observe that in a footnote Mr. Sloane himself hesitates considerably on this point.

Mr. Sloane in a footnote states that *Rhytisternus sulcatipes*, Blackb., is *R. lævilaterus*, Chaud. I cannot look upon this as more than a guess, inasmuch as M. Chaudoir never really described *lævilaterus* but only indicated its differences from *R. liopleura*. Of course it *may* be *sulcatipes* but inasmuch as M. Chaudoir says that in *lævilatera* the fifth elytral stria is "omnino obliterata," while in *sulcatipes* that stria is perfectly traceable throughout the length of the elytra; and as moreover *lævilatera* is said to be from Queensland while I have seen *sulcatipes* only from Southern Australia, I look upon the identity of the two as far from being established.

Discussing the affinities of *Cyclothorax* Mr. Sloane expresses a doubt whether that genus can be placed in any of the recognised tribes of *Carabidæ*. I think however it may be placed in the tribe for which (Proc. L.S., N.S.W., 1892, p. 85) I proposed the name *Amblytelides*.

Mr. Sloane agrees that, as stated by me Tr. Roy. Soc., S.A., 1894, p. 203, *Cyclothorax cinctipennis*, Black.=*C. (Phorticosomus) lateralis*, Cast.

Australian coleopterists owe a debt of gratitude to Mr. Sloane for such a memoir as this on which I am commenting. I sincerely hope that he will be able by degrees to treat all the larger genera of Australian *Carabidæ* as he has now treated *Homalosoma* and *Rhytisternus*, and that in due course the tribes of *Lebiides* and *Harpalides* will be dealt with by him after the manner in which he has dealt with the *Feroniides*.

TRECHUS.

T. atriceps, Macl. In Proc. L.S., N.S.W., 1892, p. 97, I mentioned having seen the type of this species at Sydney and noted that it seemed to be a *Thenarotes*. Recently Mr. Masters has been good enough to send me an example and I find that my opinion was correct. It is very close to my *Thenarotes discoidalis* var. ? *minor*, but certainly distinct, being much smaller and having the basal part of its prothorax differently sculptured. In *T. atriceps* there is a basal punctulate depression extending almost from the central channel to the lateral margin scarcely deepened into a fovea in the middle, while in *T. minor* the punctulate space is a distinct (though not sharply defined) fovea separated from the central channel by a considerable unpunctured interval.

GYRINIDÆ.

DINEUTES.

D. inflatus, sp. nov. Fem. Latissime ovatus; supra obscure viridis, prothorace elytrisque sat longe intra marginem lateralem vitta sat lata obscure cupreo-aurea (hac postice

abbreviata) ornatis; subtus piceo-ferrugineus, pedibus anticis concoloribus, posterioribus 4 paullo dilutioribus; supra fere lævis obsolete rugatus, rugis in capite prothoraceque confusis in elytris longitudinaliter dispositis, in elytrorum parte externa paullo magis distinctis substriiformibus; elytris in parte mediana magis quam latera versus convexis, parte cupreo-aurea leviter subimpressa, apicibus singulatim rotundatis. Long., 6 ; lat., 4 l. (vix).

Easily distinguishable from all the previously described Australian *Gyrinidæ* by its great width, its length being scarcely more than half again its breadth.

Victoria.

HYDROPHILIDÆ.

PHILHYDRUS.

P. eyrensis, sp. nov. Ovalis ; nitidus ; piceo-niger, palpis antennis tibiis tarsis et capitis prothoracis elytrorumque marginibus lateralibus rufis vel rufo-testaceis ; supra sat æqualiter crebre sat fortiter (elytris quam caput prothoraxque paullo magis fortiter) punctulatus ; elytris puncturis nonnullis (his seriatim dispositis) vix majoribus impressis. Long., $2\frac{1}{2}$ l. ; lat., $1\frac{1}{4}$ l.

This species is extremely like *P. melanocephalus*, Fab., and is probably the insect on the authority of which *P. melanocephalus* has been credited (I believe it is in Dejean's Cat.) to Australia. But it differs from *melanocephalus* in its head not being impressed in front of the eyes, in the evidently less strong puncturation of its prothorax and in its palpi being scarcely infuscate at the extreme apex.

Eyre's Peninsula.

HYDROCHUS.

H. Palmerstoni, sp. nov. Minus elongatus ; sat nitidus ; viridis, elytris brunneis, cupreo-submicantibus ; antennis palpis pedibusque sordide testaceis, genubus infuscatis ; capite inter oculos longitudinaliter 3-sulcato ; prothorace cordato sat crebre ruguloso-punctulato, indisco minus perspicue 3-areolato ; elytris seriatim punctulatis, puncturis basin versus sat parvis postice permagnis foveiformibus. Long., $1\frac{1}{10}$ l. ; lat., $\frac{2}{5}$ l.

A remarkable species on account of the peculiar sculpture of its elytra, the seriate punctures being in the basal one-fourth comparatively small and the interstices between the series continuous and well defined, while before the middle the seriate punctures become extremely large round foveæ of diameter greater than the width of a puncture and an interstice together in the

basal part so as to leave no continuous straight interstices between the foveæ.

Near Palmerston, N. Terr. ; taken by Mr. Walker.

BEROSUS.

B. munitipennis, sp. nov. Ovalis ; convexus ; nitidus ; supra pallide testaceus (exemplis nonnullis sparsim fusconotatis), capite prothoraceque rufescentibus ; subtus obscurus, antennis palpis pedibusque testaceis ; capite æquali, fortiter crebre antice minus crebre) punctulato, prothorace transverso fere ut caput (sed minus crebre quam hujus pars postica) punctulato ; elytris minus fortiter punctulato-striatis, ad apicem leviter emarginatis, parte emarginata extus ut spina gracilis perlonga producta, interstitiis planis sparsim sat fortiter punctulatis. Long., $2\frac{1}{2}$ l. ; lat., $1\frac{1}{5}$ l.

Allied to *B. externe-spinosus*, Fairm., but differing from that species, as described, by the much coarser puncturation of its head, its entirely testaceous legs, &c. ; differing from Queensland specimens in my collection (which I have no doubt are Fairemaire's species) and from all the other described Australian *Berosi*, also by the very long slender spine into which the external apices of its elytra are produced.

S. Australia ; taken by Mr. Zietz near Lake Callabonna.

NOTOBEROSUS (gen. nov. *Hydrophilidarum*).

Beroso affinis ; differt antennis brevioribus specie 6-articulatis (articuli 3us 4us que minutissimi cum 5° intime conjunguntur), hoc quam 6° multo latiori ; mesosterno haud carinato.

The insect for which I propose this name has very singular antennæ. Examined under a Coddington lens they appear to consist of six joints, the basal two much like those of a *Berosus*, the third conical and at its apex much wider than any of the three joints which compose the club. Under a compound microscope however the basal part of this apparent third joint seems to consist of two minute joints intimately joined to each other and the second of them to the large joint that follows.

N. Zietzi, sp. nov. Ovalis ; nitidus ; glaber ; supra albido-testaceus, clypeo capiteque in medio et postice plus minusve nigris vel obscure fuscis ; mesosterno metasterno et abdomine nigris ; antennarum clava vix infuscata ; capite prothoraceque (hoc transverso æquali) subtiliter crebre punctulatis ; elytris nullo modo striatis, sparsim inæqualiter (hic illic subseriatim) punctulatis ; nonnullorum exemplorum (? marium) puncturis raris permagnis juxta suturam positis. Long., $1\frac{3}{5}$ l. ; lat., $\frac{4}{5}$ l.

The punctures of the elytra are of several different sizes con-

fusedly and not closely intermingled; in some specimens (apparently, from the few examples taken, males) a few of these are much larger than the rest and are placed near the suture along its front half. In the male the hind margin of the penultimate ventral segment is widely and sinuously emarginate.

S. Australia; taken by Mr. Zietz near Lake Callabonna.

NITIDULIDÆ.

MACROURA.

M. Baileyi, Blackb. In Trans. Roy. Soc. S.A., 1894, p. 204, I stated that this species seemed to be identical with *Carpophilus obscurus*, Macl., on the authority of a specimen sent to me by Mr. Lea and compared by him with Macleay's type. I much regret to find that this was an error. I have since received the same species from Mr. Masters as *Nitidula concolor*, Macl., and on investigation I find that the latter name is right and that Mr. Lea's label must have been a *lapsus calami* or by some oversight have been attached to the wrong specimen. I therefore must withdraw my assertion regarding *C. obscurus*, Macl., and notify that it is *Nitidula concolor*, Macl., to which it applies.

LAMELLICORNES.

ONTHOPHAGUS.

O. Leai, sp. nov. Robustus; piceus, antennis palpisque testaceis; nonnullorum exemplorum pedibus rufescentibus; subtus rufo-hirsutus; clypeo antice late rotundato; capite creberrime subtilius transversim, prothorace (hoc subcanaliculato) paullo minus crebre minus subtiliter longitudinaliter, rugulose; elytris modice striatis, striis vix manifeste punctulatis; interstitiis sat planis sparsim leviter nec subtiliter punctulatis; tibiis anticis extus 4-dentatis (processu apicali incluso).

Maris; capite postice lamina subtransversa erecta alta armato, hac ad apicem utrinque et in medio acute prominenti; prothorace antice latissime perpendiculariter declivi, superficie perpendiculari areis 3 concavis constituta, supra aream perpendicularem medianam prothoracis dorso ut lamina horizontalis profunde bifida producto. Long., 8—9 l.; lat., 5—5¼ l.

This fine species is in most respects very much like *O. ferox*, Har., but differs from it in the shape of the frontal horn of the male which is a transverse lamina (not much wider however than high), rugulose on its face and smooth on its hind surface, soutline (viewed from the front) forming three triangles one on each side with its apex directed outward and one on the top with its apex directed upward; the rugulosity of the prothorax

moreover is markedly finer and closer than in *ferox* and of conspicuously longitudinal arrangement, the anterior projection of the prothorax is more flatly horizontal with its lobes non-divergent, &c., &c.

N.S. Wales; taken near Forest Reefs by Mr. A. M. Lea.

APHODIUS.

A. callabonnensis, sp. nov. Minus convexus; sat nitidus; piceus vel nigro-piceus, prothoracis lateribus elytris (maculis nonnullis fuscis exceptis) pedibusque (præsertim femoribus posterioribus) testaceis; capite mutico, sparsim sat fortiter punctulato, clypeo antice sinuato-truncato; prothorace ad latera capillis elongatis fimbriato, postice haud marginato, lateribus modice arcuatis, angulis posticis obtusis; scutello parvo sparsim punctulato; elytris subtiliter striatis, striis seriatim punctulatis, interstitiis suturali 3° 5° que fortiter convexis externis uniseriatim punctulatis; tibiis anticis extus bidentatis (dente apicali incluso); tibiis posticis setis inæqualibus instructis; tarsorum posticorum articulo primo elongato (quam 2us 3us que conjuncti paullo longiori), 2° quam 3us longiori.

Maris prothorace subtiliter, feminæ magis fortiter, sparsim punctulato. Long., $2\frac{4}{5}$ l.; lat., $1\frac{1}{5}$ l.

Allied to *A. sus*, Fab. The fuscous spots on the elytra are one on the fourth interstice immediately in front of the middle and several considerably behind the middle placed in a transverse line and more or less run together. Also resembles *A. lindensis*, Blackb., differing from it *inter alia* by its bidentate front tibiæ, clypeus truncate in front, sides of prothorax not emarginate behind, elytral costæ more prominent. *A. Candezei*, Har., also seems (from description) to resemble the present species but belongs to a different section of the genus having its prothorax margined behind.

Lake Callabonna; taken by Mr. Zietz.

ATÆNIUS.

A. Zietzi, sp. nov. Subovatus; nitidus; rufus vel piceo-rufus, nonnullorum exemplorum capite prothoraceque obscurioribus; clypeo antice triangulariter emarginato; capite crassissime ruguloso; prothorace inæqualiter nec crebre sat grosse punctulato; elytris fortiter punctulato-striatis, in striis puncturis parvis minus perspicuis, interstitiis sat æqualibus leviter convexis (nullo modo cariniformibus), humeris dente minuto acuto armatis. Long., 2 l.; lat., $\frac{4}{5}$ l.

Distinguished by its equal *(inter se)* and non-cariniform elytral interstices from *A. australis*, Hope and from all the Australian

Atænii that I have described except *A. goyderensis* (of the Horn expedition); the latter differs from it by its black color and much less coarsely punctulate prothorax. The species described by Sir W. Macleay as *Ammœcii* (some at least of which seem to be *Atænii)* all have either cariniform elytral interstices, or very deeply punctulate elytral striæ or differ greatly in size from the present species, and are all from parts of Australia very far distant from Lake Callabonna.

Lake Callabonna; taken by Mr. Zietz.

TROX.

T. Crotchi, Har. I have lately received an example from the collection of M. Thomson under this name, which agrees very well with Harold's description and I have no doubt is correctly named. It is clearly identical with specimens from Central Australia which I had attributed to *T. Crotchi* and is very close to *T. eremita*, Blackb., but I think the latter is a good species, as it differs from the type of *Crotchi* in having the larger tubercles on its elytra less large and of more elongate form also more numerous than the corresponding tubercles in *Crotchi* and also differs in the external teeth of its front tibiæ considerably smaller and more obtuse.

T. strzeleckensis, sp. nov. Sat late ovatus; opacus; niger, indumento sordido vestitus; capite minus crebre nec rugulose punctulato, bituberculato; clypeo antice fortiter angulato; prothorace quam longiori fere duplo latiori, postice in medio fortiter lobato, ut caput punctulato, supra costis tuberculisque nitidis sat angustis inæquali, lateribus sat fortiter trilobatis, angulis posticis obtuse rectis; elytris seriebus 10 tuberculorum elongatorum (his costas fractas simulantibus) inter se æqualibus insignibus, tuberculis majoribus vix elevatis nitidissimis per superficiem totam hic illic intermixtis, serierum interspatiis seriatim minute granulatis; tibiis anticis extus dentibus 2 (mediano et apicali) permagnis armatis; prosterno postice vix prominulo. Long., 6—7 l.; lat., 4—4$\frac{1}{5}$ l.

The sculpture of the elytra is the strongly distinctive character of this species; it consists of eight opaque rusty-looking cariniform lines on each elytron which are similar *inter se* except that the second and fourth are less broken near the base than the rest, each of which is broken into short pieces (about 15 in number), and besides which there are on each elytron a somewhat similar but less defined line close to the suture and two ill-defined ones between the eighth and the lateral margin, a number of scarcely elevated somewhat star-shaped nitid spaces scattered confusedly over the elytra, and a row of very minute granules between each

two of the above mentioned broken carinæ. This insect is perhaps near to *T. Brucki*, Har. (which is known to me only by description), but cannot be identical with it since *Brucki* is described "processu prosternali valde tumidulo" whereas the prosternal process of this species is as slightly developed as in any *Trox* known to me; it is angular behind but scarcely projects beyond the general contour of the prosternum.

Lake Callabonna and Strzelecki Creek; taken by Mr. Zietz.

LIPARETRUS.

L. distinctus, sp. nov. Sat nitidus; supra fere glaber; brunneo-testaceus, nonnullorum exemplorum capite subinfuscato; hoc cum prothorace crebre subfortiter punctulato; clypeo antice plus minusve fortiter tridentato vel trisinuato; prothorace fortiter transverso, manifeste canaliculato, antice minus angustato, lateribus sat rotundatis; elytris sat fortiter geminato-striatis, interstitiis sat crebre sat fortiter punctulatis; pygidio crebre fortiter punctulato; tibiis anticis extus dentibus 2 (apicali incluso) elongatis acutis et alio parvo supra medium armatis; tarsorum posticorum articulis basalibus 2 subæqualibus; antennis 9-articulatis.

Maris segmento 2° ventrali penicilla hirsuta perlonga postice in medio instructo; feminæ mutico. Long., $3\frac{1}{2}$ l.; lat., 2. l.

This is the only described species (of the section having the front of the clypeus tridentate) of uniform testaceous color.

Lake Callabonna; taken by Mr. Zietz.

L. melanocephalus, sp. nov. Præcedenti valde affinis; capite, elytrorum basi summa, sternis, segmentis ventralibus (apicali excepto) et tibiis tarsisque posticis atris; tarsorum posticorum articulo 2° quam 1us manifeste breviori; cetera ut præcedentis *(L. distincti)*.

Maris segmentis ventralibus (apicali excepto) in medio penicilla transversa instructis; feminæ muticis. Long., 3 l.; lat., $1\frac{4}{5}$ l.

Lake Callabonna; taken by Mr. Zietz.

L. aridus, sp. nov. Sat nitidus; supra fere glaber; testaceus; capite minus crebre minus subtiliter punctulato; clypeo antice subtruncato (maris quam feminæ minus late); prothorace fortiter transverso, sat sparsim sat subtiliter punctulato, haud canaliculato, antice minus angustato, lateribus angulisque posticis rotundatis; elytris leviter geminato-striatis, interstitiis leviter sat crebre punctulatis; pygidio sparsim leviter (fere obsolete) punctulato; tibiis anticis extus dentibus 2 (apicali incluso) modicis et alio minuto supra medium armatis; tarsis gracilibus, posticorum articulo 2° quam 1us manifeste longiori; antennis 9-articulatis.

Maris quam feminæ statura magis angusta, antennarum flabello magis elongato. Long., 3 l.; lat., $1\frac{2}{5}$—$1\frac{7}{10}$ l.

At once distinguishable (in the group of *Liparetri* having the antennæ 9-jointed, the clypeus more or less rounded or subtruncate in front, and the body glabrous, or nearly so, above) by its uniform pale testaceous color. The flabellum of the antennæ is nearly white.

Lake Callabonna; taken by Mr. Zietz.

COLPOCHILA.

C. palpalis, sp. nov. Sat elongata; nitida; supra subglabra, prothorace et elytrorum basi capillis elongatis fimbriatis; subtus (abdomine pygidioque capillis subtilibus erectis sparsim vestitis exceptis) dense hirsuta; albido-testacea, capite (hoc plus minusve infuscato) pedibusque (horum dentibus spinis et carinis plus minusve infuscatis) rufescentibus, prothorace pallide brunnescenti; capite fortiter sat crebre rugulose (clypeo, parte postica excepta, subtiliter nec rugulose), prothorace subtiliter sparsissime, elytris (his obsolete geminato-striatis) leviter vel vix manifeste, pygidio leviter sparsissime, punctulatis; antennis 9-articulatis; prothorace quam longiori fere duplo latiori, antice modice angustato, obsolete canaliculato, basi vix bisinuata, lateribus fortiter rotundatis, angulis anticis acutis posticis rotundatis; elytrorum apice haud producto.

Maris antennarum flabello quam articuli præcedentes 5 conjuncti sat longiori; palporum maxillarium articulo apicali dilatato, quam præcedentes 2 conjuncti sat longiori; tibiis anticis (exempli typici) carentibus.

Feminæ antennarum flabello quam articuli præcedentes 5 conjuncti vix longiori; palpis maxillariis normalibus; tibiis anticis extus fortiter 3-dentatis. Long., 10 l.; lat., $5\frac{1}{5}$ l.

This insect is very remarkable by reason of the form of the palpi in the male, which are fully as long as the head, the apical joint being dilated and especially elongate; its form is curved and its upper surface is deeply bisulcate, the space between the sulci convex, presenting the appearance of the joint being a husk split open lengthways and revealing an enclosed kernel. It is unfortunate that the only male in the collection has lost its front legs as without examining those organs it seems just possible that the species ought to be regarded as an aberrant member of the *Clavipalpides*. Its simple claws, however, and mandibles of the *Sericoid* type point strongly to the probability that the front legs of the male are not of the *Clavipalpid* type. I have dissected a female and failed to find any character to distinguish it rom a female *Colpochila*, so I feel little doubt that the insect

belongs to the *Sericoides* and can be separated from *Colpochila* only by the peculiar palpi of the male. It seems undesirable to omit describing this insect in spite of the imperfection of the male type, as it is from a remote inland locality whence more material cannot be expected at any early date ; nor does it seem practicable to found a new genus on it without examining an unbroken male. If the difference from *Colpochila* prove to be limited to that of the male palpi I doubt whether it can rightly be treated as generically distinct from *Colpochila*, and, for the present at any rate, it seems best to place it in that genus, of which it has entirely the facies. In my tabulation of *Colpochila* (Proc. L.S.N.S.W. 1890, pp. 520, &c.) it falls under "EE" on p. 521, along with *C. gigantea*, Burm., from which it is very distinct by many characters—*inter alia* its nearly white color and the antennal flabellum of the male consisting of only three joints. The characters of the palpi in the male of course distinguish it from all the other described species of the genus.

Lake Callabonna ; taken by Mr. Zietz.

CALLABONICA (gen. nov. *Heteronycidarum).*

Mentum quadratum, tectiforme ; labrum (speciei typicæ) verticale supra clypeum sursum productum; antennæ (speciei typicæ) 8-articulatæ, flabello 3-articulato, articulis brevibus ; alæ obsoletæ ; cetera ut *Heteronycis.*

It seems impossible to refer the species for which I propose this name to any hitherto characterised genus ; its appendiculate claws aborted wings (which are only about half as long as the elytra) and remarkable mentum taken together render it easy of identification. The mentum is somewhat of the form known in geometry as a "triangular prism," being formed of two plane surfaces meeting down the middle line and sloping down from the middle line on either side, the extreme front also being sloped (or obliquely truncate) and representing I presume the ligula. Unfortunately there is not an example that can be devoted to dissection. The general appearance is that of a very short *Heteronyx*, with very convex elytra much rounded on their lateral outline. The genus is no doubt near *Pseudoheteronyx* but differs from it *inter alia* by the form of its mentum, by its wings not being altogether wanting, and by its longer metasternum (which however is somewhat shorter than in *Heteronyx).* It also bears some general resemblance to *Byrrhomorpha* from which however its appendiculate claws at once separate it. It is certainly incapable of flight, and no doubt is found (like *Pseudoheteronyx)* under stones.

C. propria, sp. nov. Nitida; nigra, antennis palpisque testaceis, pedibus rufescentibus; capite æqualiter confertim sat fortiter

ruguloso, prothorace elytrisque grosse sat crebre sat æqualiter (elytris quam prothorax paullo magis crebre), pygidio leviter squamose sat subtiliter, punctulatis ; corpore supra sparsim vix manifeste (capite magis crebre) fulvo-pubescenti, subtus pygidioque pilis erectis minus crebre vestitis ; clypeo antice late leviter emarginato ; hunc labro superanti ; prothorace quam longiori fere duplo latiori, antice vix angustato, angulis anticis acutis productis posticis obtusis, lateribus sat arcuatis; elytris haud striatis ; coxis posticis metasterno longitudine sat æquali ; tibiis anticis extus fortiter acute tridentatis ; tarsorum posticorum articulo 2° quam 1us duplo longiori. Long., 5½ l.; lat., 3—3½ l.

I do not find any notable sexual difference, but the proportionally wider specimen is probably a female.

Lake Callabonna ; taken by Mr. Zietz.

HETERONYX.

H. suturalis, sp. nov. Modice elongatus, sat convexus ; postice vix dilatatus ; sat nitidus ; ferrugineus, elytrorum sutura infuscata ; subtiliter minus crebre pubescens ; capite grosse subcrebre (clypeo magis crebre), prothorace sat sparsim sat fortiter, elytris squamose subtilius sat crebre, pygidio leviter sat grosse, punctulatis ; clypeo antice late levitere marginato, ante oculos minus dilatato, sutura clypeali subtili fere recta ; prothorace quam longiori fere duabus partibus (postice quam antice dimidia parte) latiori, lateribus sat arcuatis, basi leviter bisinuata, angulis anticis sat acutis vix productis posticis rotundato-obtusis ; elytris haud striatis, transversim minus manifeste rugatis ; tibiis anticis extus dentibus 2 (apicali incluso) acutis magnis (alioque parvo supra medium posito) armatis ; labro clypeum sat late superanti ; antennis 9-articulatis ; coxis posticis ad latera quam metasternum manifeste brevioribus, quam segmentum ventrale 2um paullo longioribus ; tarsis posticis modice elongatis, articulo 2° quam 1^{u} parum longiori ; unguiculis appendiculatis. Long., 3½ l. ; lat., 1⅘ l.

This species belongs to my "Group VII." of *Heteronyx* (vide P.L.S.N.S.W. 1889, p. 1219) which is tabulated in loc. cit. pp. 662, &c. In the tabulation it falls beside *H. vacuus*, Blackb., to which it is closely allied, differing however *inter alia* by its more strongly transverse and more coarsely punctulate prothorax, and the well-marked infuscation of its elytral suture.

Lake Callabonna ; taken by Mr. Zietz.

HYPHORYCTES (gen. nov. *Dynastidarum*).

Mentum hirsutum, sat elongatum, sat convexum, antice rotundatum ; palpi modici, articulo apicali elongato-ovali ; mandibulæ

externe bidentatæ (fere ut *Isodontis);* clypeus antrorsum angustatus, a capite sutura subtili angulata in medio tuberculo armata divisus; caput haud carina marginatum; prothorax æqualis; pedes breves crassissimi, tibiis anticis extus obtuse bidentatis (processu apicali excluso) posterioribus 4 transversim bicarinatis, tarsorum posticorum articulo basali fortiter ad apicem dilatato; processus prosternalis validus hirsutus; organa stridulationis nulla; maris tarsorum anticorum unguiculus externus crassus bifidus.

I cannot refer the species for which I propose this name to any existing genus, nor is it clear in which of his subtribes of *Dynastides* Lacordaire would have placed it, as the absence of sexual characters in the head and prothorax would associate it with subtribes in which the basal joint of the hind tarsi is of very different structure. It is generically very close to *Pentodon australis*, Blackb., but differs from it *inter alia* by the much more strongly dilated basal joint of its hind tarsi.

H. maculatus, sp. nov. Sat elongatus; minus nitidus; testaceo-rufus, suturis et carinis corporis pedumque fere omnibus et prothoracis utrinque macula laterali infuscatis; capite crebre subfortiter ruguloso, clypeo antice truncato leviter reflexo; prothorace quam longiori dimidia parte latiori, antice fortiter angustato, sparsim subtiliter (vix manifeste) punctulato, lateribus (superne visis) parum arcuatis; scutello magno lævi; elytris vix (vel nullo modo) striatis, obsolete seriatim punctulatis; pygidio antice crebre subtiliter postice vix manifeste punctulato. Long., 6—8 l.; lat., $3\frac{1}{2}$—5 l.

I have seen several examples of this insect; one of them has the elytra faintly striate with indications of about four obsolete costæ and some very faint but distinct punctures; in the other examples this sculpture is scarcely discernible; the difference is not sexual. I have no doubt they all appertain to one species.

Thursday Island; also Cape York.

NOVAPUS.

N. rugosicollis, Blackb. At the time when I described this species (Proc. Linn. Soc. N.S.W. 1890 p. 305) I was doubtful of the sex of the type but concluded with hesitation that it was a male. Subsequent examination of more recently acquired examples of the genus has satisfied me that it is a female. I have no doubt the male has a large excavation on the prothorax.

N. nitidus, sp. nov. Mas. Brevis; latus; nitidus; subtus sat dense rufo-hirsutus; piceo-rufus; capite cornu recurvo acuto armato; prothorace quam longiori fere duplo latiori, antice valde angustato, excavatione permagna a basi ad apicem extensa pernitida fere lævi impresso (hujus lateribus sursum

obtuse prominentibus), partibus lateralibus sat fortiter sat crebre punctulatis, lateribus fortiter rotundatis, angulis anticis sat acutis posticis obtusis, margine antico fere truncato, elytris fere lævibus. Long., 10½ l.; lat., 6 l.

A second example of this insect (in the collection of C. French, Esq.) is larger (long. 12 l.) and has the lateral parts of the prothorax a little less closely punctulate, but presents no other difference. The clypeus of this species as of the others of the genus known to me is somewhat narrowly produced forward in the middle, and the apex of the projection is rather strongly reflexed. This species may be at once distinguished from all the others of the genus that I have seen by its almost lævigate elytra which are marked only with a fine sutural stria two or three obsolete striæ (resembling faint wrinkles) and some very faintly impressed and distantly placed punctures.

N. Queensland.

N. bidentatus, sp. nov. Mas. Sat brevis; minus latus; sat nitidus; subtus sat dense rufo-hirsutus; rufus; capite cornu vix recurvo acuminato minus elongato armato; clypeo antice fere æqualiter rotundato, margine reflexo sat alte cincto; prothorace quam longiori vix dimidia parte latiori, antice valde angustato, excavatione permagna a basi ad apicem extensa fere lævi impresso (hujus lateribus sursum obtuse prominentibus), partibus lateralibus antice sparsissime punctulatis postice lævibus, lateribus rotundatis postice sinuatis, angulis anticis acutis posticis fere (nec acute) rectis, margine antico leviter fere æqualiter emarginato prope medium utrinque tuberculo parvo acuto armato; elytris striis nonnullis leviter impressis, his seriatim (interstitiis confuse) inæqualiter punctulatis. Long., 9 l.; lat., 5½ l.

The two small sharp tubercles placed one on either side of the middle of the front margin of the prothorax distinguish this species from all the others yet described of the genus.

Central Australia; McDonnell Ranges.

PSEUDORYCTES.

P. monstrosus, sp. nov. Mas. Nitidus; rufus, capite elytris pygidioque nigris; capite hirsuto antice perpendiculari, parte perpendiculari planato crasse ruguloso, cetera sparsim punctulato; antennarum flabello elongato, hujus articulis singulis quam articuli ceteri conjuncti manifeste longioribus; prothorace sparsim minus evidenter punctulato, sparsim hirsuto, spinis 3 perlongis (quam prothoracis latitudo sublongioribus) sat gracilibus armatis (ex his alio antico sinuato antrorsum et sursum oblique directo, aliis fere erectis utrinque paullo ante medium positis); scutello elytrisque

fere lævibus nitidissimis, his stria suturali fortiter impressis; corpore subtus dense hirsuto; pygidio fere glabro. Long., 9 l.; lat., $5\frac{1}{2}$ l.

This extraordinary species is instantly distinguishable from its described congeners by the remarkable armature of its prothorax which consists of three somewhat slender horns of about equal length, each of them about as long as the prothorax is wide. Its black head prothorax and pygidium are also notable. The perpendicular front of its head viewed from in front is flattened,—not concave as in that of *P. mullerianus*,—and is almost of semicircular shape, the chord of the semicircle (which however is slightly arched) forming its upper outline.

Gascoigne District, W. Australia; in the collection of Mr. French.

P. trifidus, sp. nov. Mas. Latus; sat nitidus; rufo-brunneus; capite antice perpendiculari, parte perpendiculari concavo; antennarum flabello elongato; hujus articulis singulis quam articuli ceteri conjuncti multo longioribus; prothorace sparsim subtiliter (parte excavata magis crasse) punctulato, cornubus 3 armatis (his quam prothoracis latitudo fere triplo brevioribus, cornu antico valde trifido, lateralibus crassissimis sed apicem versus sat gracilibus); scutello sparsim punctulato; elytris inæqualiter striatis, striis crebre sat fortiter punctulatis, interstitiis sparsim inæqualiter punctulatis; corpore subtus dense hirsuto; pygidio crebre (apicem versus sparsissime) punctulato. Long., 12 l.; lat., 7 l.

This species is easily recognisable by the armature of its prothorax; the front horn is directed forward over the head and turned upward at the apex which consists of three large triangular teeth (the middle one erect, the lateral ones directed outward on either side); the lateral horns are placed very widely apart and are erect but a little curved (so as to be convergent at their apices), and are extremely thick at their base but in their upper half become slender with almost pointed apices. The striation of the elytra is much better defined than in *P. mullerianus*, White.

Queensland; Darling R. district; in the collection of Mr. G. Masters.

HORONOTUS.

H. optatus, Shp. I have before me three male specimens forwarded by Mr. French evidently of this species. I should judge from the description of *H. variolicollis*, Fairm., that it is founded on the same species and must become a synonym. It seems also probable that my *Palmerstonia minor* is the female (which appears to have been unknown to both Sharp and Fairemaire) of

the same species. Whether the Australian species referred by Sharp and Fairemaire to this Indian genus *Horonotus* are satisfactorily placed there or are better regarded as generically distinct (in which case my name *Palmerstonia* will stand) I am not in a position to determine positively, as I have not an example of any Indian species for comparison, but it may be noted that according to Burmeister (the author of the genus) and Lacordaire, one of the generic characters of *Horonotus* consists in the prothorax being armed with an excavation and also one or more prominences in both sexes. In my *Palmerstonia* and in the only Australian species attributed to *Horonotus* of which the female is known *(H. duplex*, Shp.) the prothorax of the female is quite even; this appears to me to be an important character and to render justifiable the use of a distinctive generic name.

SEMANOPTERUS.

S. rectangulus, sp. nov. Ovalis; sat latus; nitidus; piceus, capite prothoraceque nigris, antennarum clava rufescenti; subtus longe sat dense rufo-pilosus; capite transversim rugato tuberculo conico inter oculos armato; prothorace quam longiori plus quam dimidio latiori, minus crebre (in medio obsolete, sed in depressione crasse squamose) punctulato, antice angustato, lateribus sat fortiter rotundatis mox ante basin subito fortiter incurvis hinc ad basin (superne visis) rectis, angulis anticis sat prominulis posticis acute rectis; elytris 4 costatis (costa suturali inclusa), interstitiis sat crasse nec crebre nec profunde punctulatis; tibiis anticis extus fortiter (maris quam feminæ magis acute) tridentatis; segmento ventrali 6° punctulato, postice vitta transversali lævi marginato; processu prosternali angusto carinato.

Maris prothorace antice fossa magna rotundata profunda, postice sulco longitudinali in medio dilatato, impresso; segmento 6° ventrali postice emarginato.

Feminæ prothorace longitudinaliter sulcato, sulco et ante et pone medium dilatato; segmento ventrali 6° simplici. Long., 7 l.; lat., 4 l.

It is extremely difficult to arrive at any satisfactory conclusion as to the limits of species in this most perplexing genus; specimens taken in company and certainly seeming to be of but one species vary considerably in the puncturation of the upper surface (especially in the distinctness of the prothoracic punctures and in the extent to which the punctures of the elytral interstices invade the edges of the costæ) and even in the width of the prothorax. The insect described above is however easily recognisable by the peculiar outline of the prothorax which is very suddenly and strongly contracted a little in front of the

base and thence (viewed from above) quite parallel hindward, the hind angles being sharply rectangular (almost dentiform). The shape of the prosternal process also calls for attention. This in the genus *Semanopterus* rises perpendicularly behind the coxæ and its summit is bent forward so as to project slightly between the coxæ towards the head. In the present species it is densely clothed with long setæ and is considerably narrower than in some species of the genus; its perpendicular face is strongly convex,—almost cariniform,—and its forward bend is only slight, the bent-forward part being quite narrow and almost evenly continuing the curve and convexity of the perpendicular part. In some species the bent-forward part is much wider flatter and almost at a right angle to the perpendicular part.

Alice Springs, Oodnadatta, Leigh's Creek and Barrow's Creek.

S. persimilis, sp. nov. Ovalis; sat latus; nitidus; piceo-niger, subtus obscure rufescens longe sat dense rufo-pilosus; capite crasse squamose ruguloso, tuberculo conico inter oculos armato; prothorace quam longiori dimidio latiori sat crebre sat fortiter (in depressione crasse squamose) punctulato, antice angustato, lateribus sat fortiter rotundatis mox ante basin subito fortiter incurvis hinc ad basin (superne visis) rectis, angulis anticis sat prominulis posticis acute rectis; elytris 4-costatis (costa suturali inclusa), interstitiis sat crasse nec crebre nec profunde punctulatis; tibiis anticis extus valde fortiter (maris quam feminæ etiam magis fortiter) tridentatis; segmento ventrali 6° punctulato, postice vitta transversali lævi marginato; processu prosternali sat angusto carinato, parte summa antrorsum directa minute planata et antrorsum deelivi.

Maris prothorace antice fossa magna rotundata profunda, postice sulco longitudinali, impresso; segmento 6° ventrali postice emarginato.

Feminæ prothorace longitudinaliter sulcato, sulco et ante et pone medium dilatato; segmento ventrali 6° simplici. Long., 7—8 l.; lat., 4—4⅖ l.

This species is very closely allied to *S. rectangulus*, Blackb., from which it differs by the nearly black color of its upper surface, the evidently stronger puncturation of its prothorax, the larger teeth on the external margin of its front tibiæ, the more confused sculpture of its clypeus and the different shape of its prosternal process. This latter (as in *rectangulus*) consists of an erect somewhat narrow piece keeled on its hind face rising from the surface of the prosternum behind the coxæ and at its summit bent forward slightly towards the head; but whereas in *rectangulus* this bending forward is the result merely of the top

of the process being slightly curved, in *persimilis* a small flattish lamina appears to jut out (from the top of the process) directed towards the head and also sloping downwards, so that from a certain point of view *(i.e.* from the side) the top of the process seems to be obliquely truncate with its point furthest from the head subtuberculiform. The process (as in *rectangulus)* is densely hirsute but in this species the front part of the flattened top is glabrous. This species is distinguished from all the recognisably described *Semanopteri* (except *rectangulus)* by the peculiar outline of its prothorax which (viewed from above) looks as if a small piece had been cut-out on either side close to the base.

N. Queensland; sent by Mr. French.

S. dentatus, sp. nov. Late ovalis; minus convexus; nitidus; piceo-niger, subtus vix rufescens, rufopilosus; capite crasse squamose nec profunde ruguloso, tuberculo magno armato, pone tuberculum fossa lævi impresso; prothorace quam longiori plus quam dimidio latiori, subgrosse minus crebre nec profunde (in depressione et versus angulos anticos crasse squamose) punctulato, antice angustato, margine antico in medio leviter elevato, lateribus sat rotundatis, angulis anticis sat prominulis posticis (superne visis) rectis (haud acute); elytris minus æqualiter sat crasse leviter punctulato-striatis, vix manifeste costatis, puncturis striarum et interstitiorum nonnihil confusis; tibiis anticis extus fortiter tridentatis; abdomine sparsim leviter squamose punctulato; processu prosternali minus angusto, retrorsum fortiter bidentato.

Mas latet.

Feminæ prothorace antice fossa rotundata, postice sulco longitudinali obsoleto, impresso. Long., 11 l.; lat., 6 l. (vix).

The remarkable form of the prosternal process at once separates this species from its described congeners. The process may be described as rising upwards from the level of the prosternum behind the coxæ, but instead of rising erectly it inclines forward, and its hinder face bears two large transverse blunt teeth or tubercles (one below the other) and is nearly glabrous. The nitid depression on the head behind the tubercle is also very distinctive. As the apical ventral segment is not emarginate I presume the example before me is a female. The prosternum *in front* of the coxæ is somewhat wide, with a strong median keel.

N. Queensland.

S. carinatus, sp. nov. *S. persimili* valde affinis; differt dentibus tibiarum anticarum minoribus, tarsorum posticorum articulo basali ad apicem minus lato, processu prosternali ad summum sat longe horizontali anguste cariniformi, nec tuberculato. Long., 7 l.; lat., 4 l.

This species is extremely like *S. rectangulus*, Blackb., and *S. persimilis*, Blackb., but differs from both by characters that appear to me quite inconsistent with specific identity. The most notable of these is the form of the prosternal process, which at the top is bent forward towards the head in such fashion that its bent-forward portion almost forms a right angle with its erect portion,—but this (*i.e.*, the bent-forward portion) instead of being a small flattish lamina bounded posteriorly by a tubercle (as it is in *persimilis)* is a narrow keel (its outline viewed from the side being seen however to be slightly concave) ; while in *rectangulus* the bent-forward portion is scarcely existent being represented merely by the erect portion being slightly curved towards the head at its summit. The prosternum *in front of* the coxæ is in all these three species narrow and roundly cariniform. The puncturation of the prothorax is in this species almost as in *rectangulus* but the sulcus of the hind part of the prothorax is simple as in *persimilis* (not dilated in its middle into a fovea as it is in *rectangulus*).

Northern Territory of South Australia ; near Palmerston.

N.B.—The species of *Semanopterus* named previously to those I have described are *S. (Phileurus) subcostatus*, Cast., *S. Adelaidæ*, *subæqualis* and *depressus*, Hope, and *S. convexiusculus* and *depressiusculus*, Macl. None of them are described sufficiently for confident identification and it is possible that I may have described some of them, especially the first,—the description of which would apply so far as it goes to any *Semanopterus*. I, however, have species in my collection which seem likely to be *Adelaidæ*, *subæqualis*, and *convexiusculus* and are certainly distinct from those I have described. I should judge from their names that *S. depressus* and *depressiusculus* cannot be identical with any of my species unless it be *S. dentatus*,—but they are both described as having costate elytra, while *dentatus* is of all the *Semanopteri* known to me the only one on which no clearly defined elytral costæ can be traced.

ISCHIOPSOPHA.

I. Bourkei, sp. nov. Nitidissimus ; læte viridis (vel certo adspectu cœruleus), antennis palpisque piceis plus minusve viridi-micantibus, abdominis suturis parte mediana maculisque lateralibus certo adspectu nigricantibus ; supra tota creberrime omnium subtillissime coriacea ; capite sparsius subtilius punctulato, clypeo profunde bifido ; prothorace (lobo basali excepto) quam longiori (et postice quam antice) duplo latiori, latera versus leviter sparsim (in disco vix manifeste) quam caput multo minus fortiter punctulato, lobo basali magno scutellum fere obtegenti ad apicem emar-

ginato ; elytris lævibus nisi juxta marginem lateralem transversim strigatis, sutura postice carinata et ad apicem spinoso-producta ; pygidio concentrice sat fortiter strigato ; subtus sublævis vel potius obsolete sparsissime punctulata, segmentis ventralibus singulis utrinque spatio crebre oblique strigato ornatis ; processu mesosternali elongato sat horizontali.

Maris capite elongato, tibiis anticis extus (processu apicali excepto) dente minuto subapicali (et altero submediano haud vel vix manifesto) armatis ; abdomine longitudinaliter concavo.

Feminæ capite minus elongato, tibiis anticis extus dentibus 3 (apicali incluso) sat fortibus armatis ; abdomine sat æqualiter convexo, segmento 5° postice puncturis nonnullis sat magnis impressis. Long., 13 l.; lat., 6½.

I cannot find among the numerous species of *Ischiopsopha* described (some of them as *Lomapteræ)* as occurring in New Guinea and Malay that this large and magnificent insect has a place. Compared with *I. (Lomaptera) pulchripes*, Thoms., the present species is larger and of a more robust build,—differently colored, its green tending towards blue whereas that of *pulchripes* tends towards golden,—its head is very similar except more finely sparsely and faintly punctured, especially in the hinder part,—its prothorax is much more strongly transverse, devoid of transverse strigosity, and very much less strongly punctured (the punctures even close to the lateral margin being very sparse and scarcely so strongly impressed as those halfway between the middle of the prothorax and the lateral margin in *pulchripes)*,—its elytra are practically punctureless (in the female the punctures where most distinct are scarcely so much so as in the middle of the prothorax of *pulchripes*, in the male they are still fainter) their sutural apex is more prominent, and their system of submarginal transverse scratches is almost exactly as in *Hemipharis insularis*, L. and G.,—its legs are very differently colored,—its whole surface under a strong lens is seen to be finely coriaceous or covered evenly with a system of excessively close and fine puncturation underlying all the other sculpture. The bluish tone of color is more marked in the males than females.

N. Queensland ; taken by Captain Edmund Bourke, R.N., and presented to me.

ASTRÆUS.

A. Meyricki, Blackb. I see that Herr. van de Poll in Tijdsckr. ent. xxxvi., p. 67, says that this name has been given to the same species as that which he called *A. Badeni.* I have already (Proc. L.S., N.S.W., 1894, p. 101) drawn attention to the facts that

Herr van de Poll and I both described some Australian *Astræi* in 1889, that his descriptions seem to have been published before mine, and that probably his *A. Jansoni* and my *A. Tepperi* are names of one and the same species. When writing that note I considered the question whether *Meyricki* and *Badeni* are identical and considered it doubtful, an opinion I still hold. Herr van de Poll gives as the first-named habitat of *A. Badeni* "Gawler, S.A.," and adds as a second locality "Swan River." I doubt whether any *Astræus* is common to these very distant localities, and if the type of *A. Badeni* really came from Gawler I should expect to find it different from *A. Meyricki* which is from N.W. Australia. No doubt the two species are at any rate much like each other, but I notice that *A. Badeni* as figured has the basal spot of its elytra extending across two interstices while in *A. Meyricki* it seems to be constantly limited to one interstice,—nor do I find any trace in *Meyricki* of the fine red line which is depicted across the basal margin of the elytra in *Badeni*. On these grounds I look upon it as quite likely that if the types of the two could be compared other differences would be found.

BUBASTES.

B. splendens, Blackb. The *Coleoptera* collected at L. Callabonna by Mr. Zietz include what I take to be a second specimen of this insect. It is notably smaller than the type with elytra tending towards violet in color and the puncturation throughout seems to be a trifle less strong but, judging from the extreme variability of its congener *B. inconsistens*, Thoms., these differences are unlikely to be specific.

CHRYSOBOTHRIS.

C. interioris, sp. nov. Obscure ænea, hic illic cuprascens, elytrorum foveis sat læte cupreis; capite antice sat crasse ruguloso-punctulato et transversim inæquali, postice crebre subtilius punctulato (in medio lævi et canaliculato), oculis minus approximatis; prothorace quam longiori duabus partibus latiori, leviter canaliculato (canali antice obsoleto), crebre subtilius transversim rugato et sat crebre punctulato, antice et postice æqualiter angustato, inæquali (præsertim utrinque oblique leviter impresso), lateribus (superne visis) in parte mediana rectis vel fere concavis hinc et antice et postice angulatim convergentibus, basi valde trisinuata; elytris crebre subtilius punctulatis, costis discoidalibus 4 et costa abbreviata subscutellari instructis, foveis 3 impressis, lateribus denticulatis fere ab humero, apice obtuso; corpore subtus in parte mediana sparsim (latera versus sat crebre) punctulato, puncturis a parte antica retrorsum gradatim

minus fortiter impressis; prosterni margine antico late emarginato; segmento apicali ventrali 2-emarginato et 3-spinoso. Long., $6\frac{3}{4}$ l.; lat., $2\frac{3}{5}$ l.

The eyes are wider apart than in most *Chrysobothres* known to me. The prothorax is of peculiar form (the form probably that M. Thomson calls "subhexagonalis"), approximated however though only feebly by one or two other species in my collection; the middle part of its sides is slightly concave and at the front and hind apices of this middle part the outline is very distinctly angulated and thence proceeds obliquely to the comparatively narrow front and hind margins respectively, so that the segment is quite decidedly "octagonal" (except in so far as its regularity is marred by the trisinuation of the base). Another well-marked character is afforded by the hind outline of the apical ventral segment which is widely emarginate, either side of the emargination being produced in a strong spine, while the longitudinal carina that runs down the segment is produced hindward (dividing the emargination into two) in a third spine very little shorter than the lateral ones. I am unfortunately not able to detail the differences between this species and any other described Australian *Chrysobothris* as there is not one of those hitherto named that has been recognisably described. I have in my collection examples (conjecturally identified) of most of them but it is of no use to compare a new species with an old one unless one is quite certain of the latter. Limiting myself to the characters mentioned in the descriptions I may say however that the 3-spinose apex of its abdomen distinguishes this insect from *C. subsimilis*, Thoms., and *amplicollis*, Thoms., and that the strong oblique lateral impressions of its prothorax distinguish it from *C. Mastersi*, Macl., and *viridis*, Macl. The other species are practically undescribed, although it may be noted that Mr. Saunders' re-description of *C. Australasiæ*, Hope, seems to imply that the apex of its abdomen is not tri-spinose; their localities however are such as to render extremely improbable their identity with this Central Australian species. The elytral costæ of the present insect are very well defined and are placed as in the other Australian species; the foveæ are placed as follows,—one close to the middle of the base, one in front of the middle between the second and third costæ, one behind the middle interrupting the third costa. The front femora are strongly dentate beneath, the intermediate tibiæ nearly straight. The basal two ventral segments are shallowly concave longitudinally.

Lake Callabonna; taken by Mr. Zietz.

AGRYPNUS.

A. Mastersi, Macl. Specimens of *Agrypnus* taken by Mr. Zietz near Lake Callabonna vary from the type prevalent in N.

Queensland to an extent that seems scarcely consistent with specific identity,—the prothorax being very much more finely punctulate and having its sides much more sinuate behind the middle. Nevertheless as that eminent specialist Dr. Candéze has stated his opinion, after examining a long series of *Agrypni* from various parts of Australia, that he has seen only one species and that it is an extremely variable one, I deem it better to abstain from treating these Central Australian specimens as specifically distinct from *Mastersi*.

LACON.

L. Zietzi, sp. nov. Piceus; minus nitidus; squamulis piliformibus griseis vestitus (his in elytrorum interstitiis alternis paullo densioribus), antennis pedibusque rufescentibus; prothorace quam longiori vix latiori, crebre subfortiter punctulato, canaliculato (canali antice obsoleto), a basi ad apicem gradatim (leviter sinuatim) angustato, basi quam margo anticus duplo latiori, angulis posticis obtusis extus paullo dilatatis; elytris quam prothorax parum latioribus, punctulato-striatis, interstitiis subfortiter punctulatis inter se æqualibus; sulcis tarsorum nullis. Long., 5 l.; lat., $1\frac{3}{5}$ l.

The slightly denser disposition of the vestiture on the alternate interstices of the elytra than on the others,—which is more apparent in some examples than in others,—gives this species a faint appearance of being striped and renders it a little doubtful whether Dr. Candéze would place it in his tabulation (Mém. Liége (2) IX., 1882, pp. 49, &c.) among the unicolorous or the variegated species. Among the former it would stand beside *L. princeps*, Cand., and *crassus*, Cand., from which its size and the posterior angles of its prothorax not truncate readily distinguish it,—while among the variegated species it would be at once distinguished by the absence of tarsal sulci. It should be noted that although careful measurement shows the prothorax to be a trifle wider than long, that segment to a casual glance appears longer than wide.

Lake Callabonna; taken by Mr. Zietz.

MONOCREPIDIUS.

M. commodus, sp. nov. Modice angustus; sat parallelus; minus nitidus; pube fulva vestitus; totus ferrugineus, antennis pedibusque dilutioribus, scutello elytrorumque basi rufescentibus; antennarum articulo 3° quam 2us parum longiori, quam 5us duplo breviori; prothorace trans angulos posticos quam longiori vix latiori, subtiliter manifeste canaliculato (nonnullorum exemplorum canali antice posticeque abbreviato), sat crebre minus subtiliter umbilicato-punctulato, angulis posticis divergentibus, bicarinatis (carina interna

brevi minus perspicua); elytris ad apicem sat rotundatis nonnullorum exemplorum angulo suturali brevissime acuto), punctulato-striatis, interstitiis leviter convexis crebre subaspere punctulatis; prosterno medio fortiter gibbo, fortius vix crebre punctulato, hoc ad latera haud deplanato, suturis prosternalibus rectis, pronoti margine antico in prosternum deflexo; tarsorum lamella sat angusta.

Maris antennis prothoracis basin sat longe superantibus; prothorace a basi ad apicem sinuatim angustato.

Feminæ antennis prothoracis basin vix attingentibus; prothorace ad medium quam trans basin parum angustiori. Long., $6\frac{1}{2}$—$7\frac{1}{2}$ l.; lat., $1\frac{4}{5}$—$2\frac{1}{5}$ l.

The Australian species of *Monocrepidius* may be best subdivided, in my opinion, by the structure of the lateral margin of the pronotum and prosternum which assumes three different forms. In some species (*e.g.*, *Australasiæ*, Boisd.) it is strictly lateral; in others (*e.g.*, *acuminatus*, Macl.) it is deflexed in front so that (viewed from directly above) the front part of it passes out of sight and both margins can be seen together in their entirety only by turning the specimen upside down and looking at them on the prosternum, but in other respects it is as in the former group; in a third group of species (*e.g.*, *nigripennis*, Cand.) it passes on to the prosternum behind the middle of the segment (so that the greater part of it is invisible when the pronotum is viewed from directly above) and is bordered on the prosternum by a well-defined sulcus (these species mimicking some *Eucnemidæ* in their structure.

The present species belongs to the second of these groups, and is distinguishable by exceptionally good characters, among which the most noticeable are the remarkably convex—strongly protuberant—middle part of its prosternum, and the umbilicated punctures of its prothorax (inside each of which there appears to be a small granule).

Lake Callabonna; taken by Mr. Zietz.

M. inamœnus, sp. nov. Modice angustus; sat parallelus; minus nitidus; pube fulva vestitus; supra obscure brunneus, corpore subtus ferrugineo, antennis palpis pedibusque testaceis; capite postice longitudinaliter carinato; antennarum articulo 3° quam 2us vix longiori, quam 5us duplo breviori; prothorace trans angulos posticos quam longiori subangustiori, leviter canaliculato (canali antice sat obsoleto), confertissime vix aspere punctulato, angulis posticis parum divergentibus bicarinatis (carina interna sat forti minus abbreviata); elytris ad apicem sat rotundatis (angulo suturali brevissime acuto), punctulato-striatis, interstitiis leviter convexis sub-

tiliter transversim rugatis; prosterno medio fortius vix crebre punctulato, hoc ad latera sulcato, suturis prosternalibus rectis, pronoti margine in prosternum deflexo; tarsorum lamella angusta.

Maris antennis prothoracis basin vix superantibus; prothorace a basi ad apicem sinuatim angustato.

Feminæ antennis prothoracis basin haud attingentibus; prothorace ad medium quam trans basin parum angustiori. Long., 5—5½ l.; lat., 1⅗ l.

This species belongs to the third of the groups that I have suggested above as convenient subdivisions of *Monocrepidius*. It is remarkable for the extremely close puncturation of its prothorax. It may be noted that the piece of the prosternum included between the prosternal suture and the margin of the pronotum is (not as in some species acuminate, but) obliquely truncate in front. In Dr. Candéze's tabulation of *Monocrepidius* (Mon. II. pp. 191, &c.) the present species would stand beside *M. fictus*, Cand., from which *inter alia* its considerably larger size will distinguish it.

Lake Callabonna; taken by Mr. Zietz.

APHILEUS.

A. ferox, sp. nov. Sat latus; sat depressus; fusco-piceus, palpis antennis pedibusque testaceis vel piceo-testaceis; breviter cinereo-setulosus; mandibulis elongatis, quam caput (labro excluso) sat longioribus, curvatis, ad apicem acutis (haud bidentatis), pone medium intus dente valde elongato armatis; capite sat nitido inter oculos concavo, sat crebre punctulato; prothorace sat nitido, quam longiori tribus partibus latiori, obsolete canaliculato, sat crebre (ad latera fere ut caput, in medio paullo minus crebre) punctulato, trans basin quam trans marginem anticum plus quam dimidia parte latiori, subquadrato (sed lateribus versus apicem summum fortiter convergentibus, versus basin summam fortiter divergentibus), lateribus distincte explanatis sed vix manifeste marginatis, angulis posticis divergentibus; elytris striatis, striis subtilius punctulatis, interstitiis parum convexis obsolete rugulosis, apice suturali breviter spiniformi. Long. (mands. incl.), 18 l.; lat., 5⅘ l.

Larger than *A. lucanoides* and less widely shaped; differs from that species also *inter alia* by its very distinct mandibles and its more nitid prothorax with much closer puncturation. In the example before me there is a very conspicuous tubercle on the disc of the prothorax a little to the left of the central line, but in all probability this is an individual aberration.

N. Queensland; presented to me by Mr. French.

LAIUS.

L. eremita, sp. nov. Subopacus; haud setosus; coccineus, antennis nigris, elytrorum maculis binis (his marginem lateralem nec suturam attingentibus, altera minori basali altera majori subapicali) piceis, pedibus infuscatis; capite elytrisque (his sat brevibus) creberrime rugulosis vel potius coriaceis; prothorace valde transverso, inæquali, subnitido, puncturis sat magnis leviter impressis; oculis fortiter convexis.

Maris antennarum articulo 2° valde compresso-dilatato, obovato, ad apicem subtruncato; capite trans oculos quam prothorax fere latiori. Femina latet.

Long., $1\frac{4}{5}$ l.; lat., $\frac{7}{10}$ l.

A very distinct species owing to the uniform red color of its body with the exception of the two dark spots on the elytra; its unicolorous black antennæ are also characteristic.

Central Australia; near Oodnadatta.

PTEROHELÆUS.

P. fraternus, sp. nov. Late ovalis; sat nitidus; piceus antennis tarsisque dilutioribus; capite subtiliter obsolete minus crebre punctulato; prothorace fere lævigato, quam longiori (et postice quam antice) fere triplo latiori, ad latera late explanato, marginibus lateralibus vix recurvis, angulis anticis obtusis sat productis posticis sat acutis, basi sat fortiter trisinuata; elytris subtiliter seriatim punctulatis, vix striatis, ad latera late explanatis, margine explanato ante medium intus dilatato apicem versus angustiori. Long., 7 l.; lat., $4\frac{1}{2}$ l.

This species in its broad form with wide lateral margins of prothorax and elytra resembles *P. piceus*, Kirby, near which it should be placed in the first group of the genus as subdivided by Sir W. Macleay (P.L.S., N.S.W., 1887, p. 520). Its comparatively small size will distinguish it from all the other members of that group. Placed beside *P. piceus* it differs from the latter chiefly by its head and prothorax being even less distinctly punctured and its elytral sculpture consisting of mere rows of fine punctures becoming very faint near the apex, the interstices between which are perfectly flat; while the elytra of *piceus* are distinctly punctulate-striate with distinctly convex interstices.

Central Australia; in my collection; specimens taken by Mr. Zietz near Lake Callabonna scarcely differ.

HELÆUS.

H. interioris, Macl. Among the *Coleoptera* brought from Lake Callabonna by Mr. Zietz are a series of specimens which I attribute to this species, although Sir W. Macleay's description

is not of a kind to justify very great certainty. Unfortunately Sir William in his descriptions of *Helœi* has relied as a principal character on the number of granules on the elytra and this undoubtedly appears to be subject to much variety. I am convinced that the series before me cannot be regarded as representing more than one species, but there are scarcely two of them in which the elytra are identically granulate. I think them likely to be *H. interioris* because, although the description of that species mentions scarcely a character that is really specific, they all have near the suture a row of granules closer and more conspicuous than those in the other rows (and more markedly so than in most other *Helœi*) and this character is mentioned in Sir W. Macleay's description of *H. interioris*. The reliable characters of the insect before me seem to consist in its comparatively narrow elongate form and the strongly "turned up" direction of the expanded sides of the elytra. It is quite true that Sir W. Macleay calls the "margin" "a *little* reflexed" but a comparison of the terms he uses in describing other species points to the conclusion of his intending to signify that the expanded margin in *H. interioris* is more reflexed than in most other *Helœi*.

EPHIDONIUS.

E. parvicollis, sp. nov. Ovalis; opacus; niger; corpore subtus picescenti; capite creberrime subtilius subaspere (puncturis majoribus minoribus que intermixtis) punctulato; prothorace quam caput dimidia parte latiori quam elytris fere duplo angustiori, quam longiori (et postice quam antice) dimidia parte latiori, postice utrinque sulco obliquo obsolete impresso (his ambobus literam V obscure simulantibus), creberrime subtilissime punctulato (vel potius coriaceo) et puncturis paullo majoribus sparsim impresso, lateribus sat explanatis et leviter recurvis, angulis anticis obtusis posticis acute rectis vix retrorsum directis; elytris quam prothorax quadruplo longioribus, costis quinis (sutura inclusa) ornatis, inter costam et costam punctularum seriebus 4 impressis (serierum interstitiis leviter convexis); labro antice vix emarginato; maris a feminæ tibiis haud distinctis. Long., 9 l.; lat., $4\frac{3}{5}$ l.

This species seems to be near *E. Duboulayi*, Bates, but differing in several respects,—in its entirely opaque upper surface (Mr. Bates implies that *Duboulayi* is not more opaque than *acuticornis)*, its scarcely emarginate labrum, the close punctuation of its head, the simple tibiæ of the male, &c. The elytral costæ under a strong lens show the same minute tuberculation continued behind (where the costæ become very faint) as Mr. Bates describes in *E. Duboulayi*.

Lake Callabonna; taken by Mr. Zietz.

CISTELIDÆ.

HOMOTRYSIS.

H. arida, sp. nov. Fem. Sat elongata; leviter ovata; minus convexa; nitida; pilis elongatis erectis sat crebre vestita; rufobrunnea, capite postice prothoraceque picescentibus, antennis palpis pedibus labro (et clypeo antice), rufo-testaceis; capite (cum prothorace) dupliciter (subtiliter et sat fortiter) sat crebre confuse punctulato; oculis minus convexis distantibus (spatio intermedio quam antennarum articuli 3^i^ longitudo sat latiori); prothorace quam longiori parum latiori, haud canaliculato (disco utrinque vix impresso), antice modice angustato, lateribus leviter sat æqualiter (superne visis) arcuatis, basi sinuatim truncata, angulis posticis obtuse rectis (superne visis obtusis); scutello punctulato, in medio leviter carinato; elytris sat fortiter striatis, striis punctulatis (puncturis antice magnis quadratis, retrorsum gradatim obsoletescentibus), interstitiis sat planis fortius minus crebre punctulatis; antennis quam corporis dimidium paullo brevioribus, articulo 3° quam 4us manifeste longiori; segmento ventrali apicali æquali, postice rotundato-truncato. Long., 5$\frac{4}{5}$ l.; lat., 2 l.

The principal characters of this species,—among its congeners with longish erect pilosity clothing the upper surface,—lie in its feebly convex eyes, exceptionally elongate prothorax, nearly uniformly colored upper surface, and elytra with both striæ (these however only in front) and interstices conspicuously punctulate.

Central Australia; near Oodnadatta.

H. sitiens, sp. nov. Fem. Præcedenti affinis; tota picea, labro antennis pedibusque paullo dilutioribus; capite (clypeo excepto) sparsim subtilius punctulato; prothorace quam longiori fere dimidia parte latiori, ad latera sat fortiter rotundato, minus fortiter punctulato, in disco (exempli typici) haud impresso, antice vix angustato, angulis posticis magis rotundatis; scutello medio nullo modo carinato; antennarum subtiliorum magis elongatarum articulo 3° quam 4us magis longiori; cetera ut præcedentis *(H. aridæ)*. Long., 5 l.; lat., 1$\frac{3}{5}$ l.

Closely allied to *H. arida*, but differing from it by well defined characters,—especially by its antennæ and legs of dark color, the third joint of its antennæ longer in proportion to the fourth, its prothorax much more transverse and otherwise differently shaped, &c.

Central Australia; Hergott Springs.

H. callabonensis, sp. nov. *H. aridæ* affinis; differt fere ut *H. sitiens* sed colore et capitis sculptura *H. aridæ* haud dis-

pari; prothorace minus crebre vix dupliciter punctulato; elytrorum versus apicem striis magis perspicue punctulatis interstitiis manifeste convexis angustatis.

Maris tibiis anticis (paullo supra medium) dente valido armatis.

Feminæ tibiis muticis. Long., $4\frac{1}{2}$—5 l.; lat., $1\frac{1}{2}$—$1\frac{3}{5}$ l.

This species is closely allied to the preceding two. I should hesitate to consider its differences more than accidental peculiarities of an individual if I had seen only a single example, but I have before me several of each sex in all of which the distinctive characters are quite constant. *H. arida* may be at once distinguished from the other two by its considerably more elongate and less transverse prothorax arched on the sides only feebly. *H. sitiens* differs from the other two by the dark color of its antennæ and legs as well as by the sparseness of the punctures between its eyes and from *arida* by its more slender antennæ with comparatively longer third joint,—while *H. callabonensis* differs from the other two by the finer punctures of the prothorax being almost absent by the striæ of its elytra being quite conspicuously punctulate to the apex and by its elytral interstices becoming narrower and quite evidently convex near the apex.

Central Australia; taken near Lake Callabonna by Mr. Zietz.

N.B.—In my tabulation of species of *Homotrysis* (Tr. Roy. Soc. S.A. 1891 pp. 320-1) the three above described would form a separate section under "AA" on page 321 (assuming, that is, that the eyes of the male,—as is probably the case,—are not materially different in *H. arida* and *sitiens* from those of *H. callabonensis*). The tabulation then will end as follows:—

AA. Interval between eyes in both sexes greater than the width of either eye as seen from above.
  B. Punctures of elytral striæ,—at least in front half of elytra,—well defined, and quite distinct from the much smaller interstitial punctures.
    C. Head strongly and rather closely punctulate between the eyes.
      D. Coarser punctures of prothorax much confused with fine puncturation... ... *arida*, Blackb.
      DD. Prothorax almost devoid of fine punctures ... ... *callabonensis*, Blackb.
    CC. Punctures between the eyes very fine and very sparse... *sitiens*, Blackb.
  BB. Punctures of elytral striæ scarcely defined as distinct from those of the interstices... *carbonaria*, Germ.

NOCAR.

N. debilis, Blackb. This species is identical with *Cistela depressiuscula*, Macl., an example of which I have to thank Mr. Mr. Masters for. As mine is the more recent name it must sink and the insect must be known as *Nocar depressiusculus*, Macl.

ŒDEMERIDÆ.

ANANCA.

This genus is already a receptacle for widely different forms and is only waiting its time to undergo a revision which will probably involve the removal from it of all the Australian species attributed to it. Mr. Champion of the London Entomological Society (who ranks high among the specialists of our day on the *Heteromera* and to whom I am indebted for much valuable assistance in working on the family) has the Australian *Œdemeridæ* at present in hand, and I understand is about dealing with them in a memoir which I anticipate with the deepest interest. Under these circumstances it would be out of the question even if I felt competent for the task for me to meddle with it. In the Zietz collection, however, there is a species of *Œdemeridæ* which it seems very inconvenient to omit in my present work of describing the new species of that collection and as it seems quite safe to assume that the species in question is not among those in Mr. Champion's hands I venture to subjoin a description of it. In describing it the only existing genus to which it can be provisionally referred is *Ananca*. It certainly has much resemblance to some of the Australian species that bear the name *Ananca* but I doubt whether it will stand permanently as really congeneric with any of them. Its very much smaller size at once suggests wide departure from such species as *Œdemera puncta*, W. S. Macleay, *Œ. australis*, Boisd., *Nacerdes nigronotata*, Bohem., which may be regarded as fair types of the Australian insects that have been attributed to *Ananca*. These latter species however differ much *inter se* in the structure of their palpi and tarsi, —so much indeed that the three I have named may possibly be held to represent three distinct genera. The species I describe below could not, in that case, be associated with any of those three. Of them I think *nigronotata*, Boh., is the one it comes nearest to but it differs from it in notable characters, especially in its much shorter muzzle, in its smaller and much more slender tarsi, in its shorter maxillary palpi the apical joint of which is less securiform, in its shorter legs, and in its prothorax not much narrower than its elytra. Its eyes are much like those of *nigronotata* and its front tibiæ have two apical spines.

A. Zietzi, sp. nov. Testaceo-fusca, sternis abdomineque nigri-

cantibus exceptis; sat nitida; minus dense pubescens; antennis quam corporis dimidium brevioribus; capite crebre distincte, prothorace vix manifeste (hoc quam longiori parum latiori, in medio transversim inæquali, lateribus antice sat rotundatis), elytris subtilius sat crebre, punctulatis; his lineis subtiliter elevatis circiter 3 vix distincte instructis. Long., $3\frac{1}{2}$—4 l.; lat., 1 l.

Lake Callabonna; taken by Mr. Zietz.

CURCULIONIDÆ.

TALAURINUS.

T. strangulatus, sp. nov. Niger, squamis pallidis plus minusve vestitus et in tuberculis omnibus setis singulis pallidis instructus; capite coriaceo vix manifeste punctulato; rostro brevi quam caput paullo angustiori, fortiter concavo, ad apicem emarginato, carinis internis vix distinctis externis crassis minus obliquis bene determinatis obsolete grosse punctulatis; prothorace quam longiori parum latiori, mox pone marginem anticum profunde transversim sulcato, sparsim tuberculato, antice quam trans basin paullo latiori, lateribus sat arcuatis; elytris tuberculis parvis nitidis subseriatim instructis, angulis humeralibus tuberculiformibus sed vix antrorsum prominentibus; tibiis elongatis gracilibus.

Maris femoribus anticis sat dilatatis; segmento ventrali apicali pone medium transversim leviter sulcatum, sulci margine postico in medio carina transversa acuta armato.

Femina latet. Long., 7 l.; lat., 3 l.

This is a species of narrow subparallel form, its upper surface subopaque (the elytra more so than the prothorax) and bearing small tubercles all of them isolated and separated from each other by distinct intervals many of which are much larger than the area of the individual tubercles. The tubercles of the prothorax are much larger than those of the elytra and resemble small flattish warts while some of those on the elytra (especially towards the sides) are acutely conical granules. The squamosity of the specimen before me is confined to the sides where it forms small patches but probably in a perfectly fresh example it is generally distributed over the surface. I think the following characters in combination will distinguish this species; rostrum deeply concave with very well developed external ridges; prothorax very sparsely tuberculate (much more sparsely than in, *e.g.*, *T. tuberculatus*, Macl.), and with an extremely strong transverse sulcus a little behind the front margin; shoulders of elytra scarcely projected forward; apical ventral segment of male bearing a feeble transverse impression extending all across it a little

behind the middle and limited in the middle part of its hind margin by a sharply defined transverse carina; tarsi long and slender. From certain points of view the elytra appear to be feebly striate and the seriate arrangement of their tubercles is very irregular.

Central Australia; Oodnadatta.

LONGICORNES.

PARANDRA.

P. Frenchi, sp. nov. Nigro-picea, corpore subtus pedibusque plus minusve rufescentibus; nitida; capite sat crebre minus fortiter punctulato, inter oculos sat fortiter bituberculato; prothorace quam longiori dimidia parte latiori, obsolete subcanaliculato, fere ut caput sed paullo minus crebre punctulato, basin versus sat fortiter angustato, lateribus pone medium subangulatis (hinc ad basin sinuatim convergentibus), margine antico sinuato, angulis omnibus obtusis bene determinatis (anticis antrorsum, posticis extrorsum, prominulis), basi leviter sinuato-emarginata; elytris quam prothorax parum latioribus, punctulatis (ad basin ut prothorax, retrorsum gradatim magis crebre magis subtiliter); segmento ventrali apicali transverso, granulato (a basi retrorsum gradatim magis fortiter magis crebre), postice late rotundato. Long., $9\frac{1}{2}$ l.; lat., $3\frac{1}{5}$ l.

I cannot identify this insect with any *Parandra* yet described. For the sake of precision it will be well to compare it with a previously-named species. Placed beside *P. puncticeps*, Shp., it is seen to be a narrower, more parallel, and more convex insect with the puncturation of its head a little finer but not much different, and that of its prothorax and elytra like that of its head (and therefore very different from the same in *puncticeps*) except that on the prothorax the punctures are a trifle less close and on the elytra they become gradually smaller and closer from the base hindward so that towards the apex of the elytra they differ considerably from those on the head. In *P. Frenchi* the sides of the prothorax are much more narrowed (and that more sinuately) behind their quasi-angulation than in *puncticeps* and the lateral margins are wider and better defined while the front angles are decidedly prominent. The large obtuse tubercles between the eyes are wanting in *P. puncticeps*, and the mandibles are very different in the two insects. I am doubtful of the sex of the type of *P. Frenchi*, but I believe it is a female. Its mandibles are much like those of the *Lucanid Lissotus subtuberculatus*, Westw., as figured Tr. Ent. Soc., 1885, t. 12, fig. 2.

N.S. Wales; in the collection of Mr. French.

C. planicollis, sp. nov. (Mas.?) Nitidus; minus elongatus; brunneus, capite obscuriori, elytris apicem versus pedibusque dilutioribus; capite magno in medio sulcato, fortiter rugulose (area utrinque prope sulcum medianum nitida sparsim grosse punctulata excepta), mandibulis sat productis ad apicem bidentatis; prothorace (spinis exclusis) quam longiori fere duplo latiori, supra in disco planato sparsim subtiliter punctulato et foveis 3 grosse rugulosis impresso (sc. una mediana sublanceiformi, et utrinque ad basin una ovali oblique posita), lateribus late declivibus rugulosis et ad marginem spinis minoribus 2 armatis (his ad apicem retrorsum curvatis); elytris sparsim distincte punctulatis et obsolete 3—vel 4—costatis apice suturali breviter spiniformi; antennis quam corpus paullo brevioribus; pedibus inermibus, abdomine sublævi, sed segmento ventrali apicali (hoc in medio leviter emarginato) sparsim punctulato. Long., 12 l.; lat., $4\frac{4}{5}$ l.

I feel some hesitation in referring this species to *Catypnes* owing to discrepancies between the utterly insufficient original diagnosis of Mr. Pascoe and the fuller subsequent one of M. Lacordaire. For example Mr. Pascoe asserts that the eyes are "nearly entire" while M. Lacordaire calls them "assez fortement échancrés." The insect before me, however, agrees very well with M. Lacordaire's diagnosis; and therefore it would be unjustifiable (at any rate without examination of the type, which is of course impossible for me) to found a new genus for it. It is fortunately a species which can be distinguished from nearly all the other Australian *Prionides* by the combination of a very small number of its characters, viz., "sides of the prothorax not denticulate or crenulate but each bearing two well-defined spines, eyes strongly emarginate (almost exactly similar to those of *Toxeutes*), antennæ shorter than the body with basal joint very much shorter than the third, hind tarsi with basal joint shorter than the third and fourth together, third joint of the tarsi very deeply bilobed and spongiose beneath, legs extremely smooth and nitid without any denticulations, head (at least in the male) transverse and very large.

The present species is readily distinguishable from *C. Macleayi*, Pasc., by the sides of its prothorax having only two (not three) spines. The prothorax of this insect bears a remarkable resemblance in outline to that of *Toxeutes arcuatus*, Fab., but with its lateral spines very much smaller and (though directed hindward) scarcely arched.

Western Victoria; presented to me by Mr. Jung of Yorketown.

TYPHOCESIS.

T. adspersa, sp. nov. Brunnea, capite prothoraceque obscurioribus, elytris dilutioribus, squamis piliformibus niveis (his in prothorace plus minusve lineatim, in elytris ut maculæ numerosæ minutæ et fascia linearis vix antemediana, in abdominis segmentis singulis ut fascia apicalis, in partibus ceteris disperse, dispositis) vestita; setis gracilibus erectis vel suberectis sparsim instructa; capite obscure punctulato; prothorace supra sat deplanato, grosse ruguloso (exempli typici disco hic illic quasi ab indumento sculpturam tegenti instructo), lateribus in medio fere parallelis apicem versus rotundato - angustatis pone medium subito fortiter arcu emarginatis (sicut certo adspectu pone medium dens magna videtur); elytris ad basin rectis, basin versus sat crebre fortius rugulose (retrorsum gradatim magis sparsim magis obsolete) punctulatis, lateribus postice gradatim leviter convergentibus, apice singulatim rotundato - subacuminato, humeris rotundatis subcallosis. Long., 7½ l.; lat., 2½ l.

The specimen described is evidently a male, its antennæ being considerably longer than the body, but they are devoid of the ciliæ with which in the other species of the genus the basal joints of the male antennæ are clothed; joints 3-7 are armed with a fine spine at their apex. There is a second specimen evidently a female of the same species, as its antennæ are scarcely longer than the body, but it differs from the example described in being entirely black, but with exactly similar snow-white scales similarly disposed. It differs from the described specimen also in its prothorax being evenly rugulose instead of having some of the rugulosities on the disc obliterated by what looks like (but is not) patches of some extraneous indumentum. The markings on the elytra are almost absolutely the same as those on the elytra of *Zygocera pruinosa*, Boisd., the post-median fascia however being absent and the anterior fascia running from the suture obliquely hindward instead of forward.

N. Queensland; forwarded by Mr. French.

ISCHIOPLITES.

I. metutus, Pasc. Mr. French of Melbourne has forwarded to me two examples, which he tells me were taken in N. Queensland, of an insect that seems to agree perfectly with the description of this species. It is possible that a comparison with the type might reveal differences but I can find none to distinguish it from the description, which is a fairly detailed one.

ILLÆNA.

This genus is an enigma to the Australian coleopterist. I

should feel very thankful if some coleopterist in Berlin would do me the favor of procuring one of Erichson's types for me to examine (which might perhaps be possible if the specimens in the Museum are fairly numerous), or failing that examine the type and write me a description of it, especially indicating the nature of the armature of the prothorax which in one place Erichson calls "lateribus medio obsolete nodosus" and in another speaks of as being furnished "lateribus pone medium tuberculo parvo." Pascoe described a genus *Neissa* as resembling what *Illæna* must be, but no doubt distinct from it because furnished with a spine on either side of the prothorax. Subsequently I suggested (P.L.S.N.S.W. 1889, p. 455) that Erichson's expressions are not consistent enough to warrant this conclusion and expressed the opinion that *Neissa* and *Illæna* are probably identical. Subsequently still, Mr. Gahan [Tr. E.S. 1893, p. 196] mentioned his having seen an insect named (by M. Chevrolat) *I. exilis*, the prothorax of which was spined laterally and added the information that Mr. Walker had found examples of it in Tasmania (Erichson's locality). Recently my opinion on the matter has been somewhat shaken by the examination of a minute Longicorn (taken in N.S. Wales by Mr. Lea) which seems to agree much better than *Neissa* does with Erichson's description of *Illæna;* indeed I do not find any character on which this insect could be definitely stated to differ from that description provided the diagnosis of the prothoracic armature be accepted as "lateribus medio obsolete nodosus" rather than the other diagnosis which implies the presence of defined lateral tubercles. As regards Mr. Lea's insect as a *species* it must be very like, if not identical with, Erichson's species; and although the great difference in locality would suggest the probability that if Erichson's type could be compared it would prove distinct, I deem it better to regard this insect *pro tem.* as "*Illæna exilis*, Er. ?" and suppose that the species is widely distributed.

New Facts bearing on the Glacial Features of Hallett's Cove.

By W. Howchin, F.G.S.

[Read April 3, 1895.]

A scientific investigator in looking for one thing often unexpectedly stumbles on another which proves of greater interest than the primary object of his search. Eighteen years ago Professor Tate went to Hallett's Cove to look for shells. He was disappointed in the objects of his visit, but discovered the ice-polished surfaces on the cliffs which remain to this day the finest examples of their kind in any part of Australia. The announcement then made of glacial action at sea level in the latitude of Adelaide was met with incredulity not only from the public, but also from many scientific men, who without seeing the evidences prejudged the conclusions from a distance. Competent judges, however, when taken over the ground, without exception, confirmed the discoverer's diagnosis; and the interest with which this locality has come to be regarded by the geological world has rapidly increased, and Hallett's Cove must now be ranked as classic ground in Australian geology.

The meeting of the Australian Association for the Advancement of Science, in Adelaide in September, 1893, presented the opportunity for a large number of scientific men from the other colonies of verifying the evidences, and through the generosity of the President of the Association, what was called by Sir James Hector "the largest scientific excursion ever held in the Southern Hemisphere" made a pilgrimage to the spot. The evidence of ice action was taken by all present without a doubt and as overwhelming in its conclusiveness. There was the polished and grooved pavement extending at intervals for two miles along the top of the cliffs, and occurs alike on the basset edges of the purple shales as well as on the harder quartzites. There was also noted a limited quantity of morainic material, with scratched stones, resting on the glaciated platform, together with larger transported blocks at the southern end of the Cove. There was no difference of opinion on the main facts. The discussion among the geological experts was directed almost exclusively to the question of the age when this extensive glaciation occurred. Some defended the view that the glacial features did not pass under the Miocene escarpment, which at this point overlies the Archæan

shales and reaches in its talus within a few yards of the edge of the cliffs. This view supposes that the morainic matter was marginal, and that instead of passing beneath the Miocenes was banked up against the face of these beds. If this could be demonstrated it would follow that the glaciation had taken place after the Miocene deposits had been laid down, and, hypothetically, synchronous with the great glacial age of the Northern Hemisphere in Pleistocene times. Other of the visitors held this hypothesis to be improbable, (1) on the grounds that the geological interval was too brief to account for the enormous change in the physical features of the country which must be assumed in the extinct glacial valley, and that the direction of flow, which was opposed to the present lines of drainage. (2) It was considered that the soft clays and sands of Miocene age must have been swept away by the erosive force of an ice sheet that had the mechanical energy to plane down metamorphic shales and quartzites.

The question was considered of so much interest that the Council of the Association determined to set aside the sum of £20 as a fund to be devoted to works of exploration, and by this means demonstrate whether the glacial features were Pre-miocene or Post-miocene. Professor Tate and the writer of the present paper were entrusted with the duty of carrying out the explorations for this object. Valuable aid was given by Prof. T. W. E. David, the General Secretary of the Glacial Research Committee, who in December last visited Adelaide with the express purpose of assisting in the investigations. Mr. L. Birks, B.Sc., of Adelaide, was also present throughout the examination and rendered important help.

The first practical step was to obtain permission of the proprietor of the ground, Walter Reynell, Esq., J.P., to carry out the necessary operations. Mr. Reynell not only readily gave his permission, but supplied several workmen and tools to do the pick-and-shovel work. Three days were spent on the ground. The first was devoted to a general survey of the features under the guidance of Prof. Tate. The second and third days were spent in working up the details and in mapping the boundaries of the glacial deposits on the north side of Field River. Prof. Tate was unfortunately called away by urgent business and was unable to remain for the last two days' work.

Exploration.

The point to be determined was—On what do the Miocene beds of the locality rest? Do they lie immediately on the denuded edges of the Archæan metamorphic shales? Or are the

Miocene and Archæan formations separated by a wedge of glacial till? The first trial was made near the northern limits of the glacial area and at a point where the base of the Miocenes is distinctly marked by a shelf of calciferous and fossiliferous sandstone. Beneath this hard shelf of rock was a softer bed of doubtful character. A tunnel was cut for a foot or two into this underlying bed, which proved to be an arenaceous clay of a greyish color, and was seen to pass beneath the Miocene beds in an undisturbed condition. This was the first important item of evidence. We had found a bed which could not be classified either with the Archæans beneath or the Miocenes above. To expose the beds still further a trench was cut in a vertical line with the tunnel, but lower down the escarpment. The same beds as seen in the tunnel were proved in this cutting, unaltered in character, but alternating in color from red to blue or grey, and intercalated with sand bands. No junction was proved at this spot between the stratified glacial beds and the underlying Archæans, as a considerable talus blinded the latter.

A little to the south of these trials is a well-marked valley which runs due east for half a mile. This valley is excavated in a thick deposit of glacial till, carrying numerous scratched stones and erratics. One large block of coarse-grained granite measured three feet long by two feet wide. Near the western outlet of this valley the Archæans have been exposed by denudation and exhibit polished and scratched surfaces, covered by a bare and sloping bank of morainic matter. Scratched stones were plentiful in this clay. Work was begun at this spot to establish the conjunction of the glacial deposits with the Miocene base, but after a short trial it was discontinued, as a thick talus of Miocene *debris* was found covering the face near the point of junction.

A third spot was selected about midway between the valley just referred to and Black Point, where the Miocene ledge approaches nearest to the edge of the cliffs. The Archæans were seen to outcrop at the base of the hill, but without glaciated surface, whilst the Miocene ledge occupied the crest of the hill. A distance of about a dozen yards separated the two points. On laying bare the Archæan surface, the purple shales exhibited a highly glaciated face, having a steep inclination landwards, and the glacial clay was seen to be in direct contact with the polished surface. The trench was continued, vertically, until the uniformity of deposit between the Miocene base and glaciated pavement was demonstrated, the lithology of the beds agreeing entirely with those exposed in the first trench. The results obtained were considered the *quod erat demonstrandum* of the investigations and rendered any further exploratory work needless.

The Glacial Beds.

These are strongly marked off from the Archæans, on which they rest by a horizontal, or approximately horizontal stratification, as well as essentially distinct *lithological* character. They are also distinguishable from the overlying Miocenes in possessing a thinly-bedded or laminated structure, the clays are more tenacious, they frequently contain striated stones and erratics, and are separated from the Miocenes by a strongly-marked divisional plane. The line of division between the two formations gives evidence of unconformability in the eroded surface of the till and the presence of water-worn boulders, which often occupy the line of junction.

The glacial deposits thin out to the north, about half-a-mile from Black Point, where they are about 20 ft. thick, beyond which point they have not as yet been proved. They maintain an approximately uniform thickness on the top of the cliffs, but suddenly thicken within the limits of the Cove, attaining a maximum thickness in "Trig Hill," as measured by the aneroid, of 112 ft. The hill just mentioned is central to the amphitheatre of the Cove, and was a convenient point from which to take the trigonometrical readings. The glacial beds were traced from this height uninterruptedly (except where covered by blown sand) down to low-water mark. On the southern half of the Bay a steep escarpment rises to a height of 90 ft. facing the sea, and is composed throughout of boulder clay with erratics. The same beds are continued on the south side of Field River at a similar height, the river occupying a valley of erosion that has been cut through the glacial beds. How far these deposits extend seawards, and below sea level, are problems that remain to be solved. As so little money was spent on the late explorations, perhaps the Council of the Association for the Advancement of Science may think fit to make another grant, that the thickness of the beds at sea level may be tested.

Lithology of the Beds.

The beds which have been laid down within the glaciated area may be roughly classified as mudstones, friable sandstones, and conglomerates. The two trenches that were cut passed through the upper series of beds, and exposed alternating beds of reddish and grey clays, with soft sandstones of a yellowish color. These beds are distinctly stratified, and the materials uniformally fine, no stones, indeed, of any kind were met with in the trenches. A little further to the south, where the beds thicken, a dark-colored mudstone, with sandy layers and inclusions, is met with, and is highly charged with facetted and scratched erratics. This can be noticed in a thin layer on the top of the Black Point

Cliffs, but is best seen in the basal portions of the amphitheatre of the Cove, as well as in the escarpment on the southern side of the Bay, and upon the beach between tide marks. The mudstones, where they have not been exposed to the weather, are very compact and tough, and split into thin bands and cubical fragments. Thin layers of sand occur in the mudstones, and it is along the lines of these sandy partings that the rock usually splits. The sand grains are rounded, and exhibit the effects of considerable attrition, but the sand-beds are but slightly consolidated in mass, and do not, as a rule, split on lines of bedding. The conglomerates are best seen on the beach at low water, where they stand up as weathered bosses, excavated from the surrounding clays by the action of the waves. On this floor of marine denudation numerous joints are seen to run irregularly through the glacial till, and are rendered conspicuous from their being filled with a dark-colored ferruginous material.

Boulders.

If any confirmation were needed that we are face to face with glacial phenomena at Hallett's Cove, it is found in the innumerable, subangular, facetted, and scratched erratics which occur abundantly at the lower levels of the Hallett's Cove beds. As already stated, no stones of any kind were met with in the two experimental trenches cut through the beds on the northern side of the area. This may have arisen from the shallowness of the trenches and the small extent of rock exposed. The boulder till is first seen on the northern boundary of the area in the banks of the east and west valley, and on the top of the cliffs a little to the south of the principal polished face of rock. From the latter position a goodly number of striated stones have been obtained. From that point, southwards, they become conspicuous in all exposed surfaces, and can be found from the size of small pebbles, up to large masses many tons in weight. Several huge erratics occur on the beach, near the centre of the Bay, whilst on the south side of the Field River they cover the beach within tide marks, and are of great variety, as well as innumerable. It is a common feature to observe a layer of boulders at the junction of the glacial beds with the overlying Miocene, and in some instances these boulders are included in the lower part of the Miocenes themselves. They have the facies of glaciated stones, and in one or two instances I could detect the striæ distinctly preserved on their surfaces, although the wash they have been subjected to at the time of the encroachment of the Miocene Sea has no doubt obliterated the surface features from many of them. A large enclosure of metamorphic shale, in the same position, measuring twelve feet in length, has attracted

the attention of scientific visitors to the Cove. There is now no doubt that this immense fragment has been transported and placed in its present position by the agency of ice. One of the striated pebbles placed on exhibit is of interest, as taken by the writer from near the top of the "Trig." Hill, 112 feet above sea level.

Many of the erratics have no doubt been derived from the Archæans of the neighbourhood, but there are a great many that are unrepresented by any rock now known in situ for many miles, and proves that the ice must have been more than of local extent. I fear that we have too little data at present to locate these travelled stones with regard to their source. To do this effectively would involve careful petrological examinations—a promising field of research that is awaiting some competent student in this department.

Superficial Area of the Glacial Deposits.

Fortunately two little streams cut the glacial beds through their entire easternly extension, one on the north side of Black Point, and the other to the south of that landmark, so that the area of this fragment of glacial action can be mapped with approximate exactness. By following up the beds of these streams it was found that the glacial deposits extended about half a mile from the coast line, passing not only up the main, but the lateral valleys, and thinning out as the higher altitudes were reached. In the most southernly of these two streams the limit of the beds was reached near the old sheds, well known as the usual camping place for picnicers in visiting the locality. In restoring the glacial area we must imagine the outline of the Cove in preglacial times to be that of a comb or saucer-shaped depression on the flanks of the Archæan hills. The ice sheet, moving from south to north, filled this lateral depression and passed over the minor heights on its northern and southern limits. A depression of this kind on the flanks of a glacier would supply the most favorable conditions for the accumulation of a ground moraine, and its contents would also be subsequently protected from the erosive forces by the wall of hard rock with which it was nearly surrounded. The deposition of the Miocene beds over the same area in later times would still further help in preserving this remarkable outlier, the Tertiary beds acting as a protective cover that has remained to the present day.

The Age of Glaciation

is a most interesting, although difficult, question to solve. The beds in question rest upon rocks of Archæan age, the most ancient of the sedimentary series, and are capped by Miocenes, one of the newest of the geological formations. They may, therefore, be

of any age between these geological landmarks. But the time limitations are here so enormously distant from each other that they serve little purpose in fixing the date of the intermediate deposits. We can only fall back on analogies, and establish a synchronism, if possible, with the glacial deposits of other localities that offer the nearest resemblances to the beds in question. As the glaciation must have taken place before the Miocene beds were deposited, it is out of the question to refer this refrigeration of the Australian climate to the so-called Glacial Period of the Northern Hemisphere, which took place in Post-Tertiary times. In conversation with Sir James Hector, on the occasion of his visit to the spot, he suggested the possibility of the glaciation being of Cretaceous age, and stated that there were enormous glacial deposits of this age in New Zealand. I am not aware that any indications of glacial action have been observed with regard to the Cretaceous beds of this continent. There are, however, abundant evidences of a glacial period of great intensity which occurred in South-Eastern Australia during Permian, or Permo-Carboniferous times. Near Bacchus Marsh and Derrinal, in Victoria, there are glacial beds (sometimes seen to rest on polished and grooved pavements) that can be traced over hundreds of square miles, and must be several thousand feet in thickness. Having recently visited the Bacchus Marsh District, I have been able to place on exhibit, for comparison with the Hallett's Cove material, a series of specimens from the Victorian beds. The close resemblance between these two sets of exhibits will be appreciated by all. The Bacchus Marsh beds appear to have suffered more disturbance than the Hallett's Cove beds, as they dip almost uniformly at about 42° They consist of alternating beds of mudstones, thickly studded with glaciated boulders, sandstones, grits, and conglomerates. Many of the beds exhibit fine laminæ along the lines of stratification, and at other spots are locally much distorted, as though ploughed up before the ice. In lithological features they closely resemble the Hallett's Cove mudstones, sands, and conglomerates, but are more highly indurated, and in this respect have more the facies of rocks of Upper Palæozoic age. The sandstones particularly are often highly siliceous, and in one case, in the Wirribee Creek, there occurs a band of hard quartzite (a specimen of which is on the table). The age of these glacial beds of Victoria has been determined by the remains of *Gangamopteris*, a fossil fern characteristic of Permo-Carboniferous age, which occurs in considerable numbers at one or two horizons intercalated with beds of glacial origin. The importance of these glacial conditions in Permian times is accentuated by the fact that deposits which seem to require ice action to account for their existence, are

found of this age in such remote places as Great Britain, India South Africa, and Australia. It is possible that further search in the Hallett's Cove beds may bring to light some fossil remains that will definitely fix the date of their deposition, but at present analogy seems to point most strongly to the conclusion that the Bacchus Marsh and the Hallett's Cove formations belong to the same geological age. The Victorian beds rest on Silurian, or on granite, and, like the Hallett's Cove beds, are capped by Tertiaries.

The Inman Valley Shale.

Since the late important discoveries at Hallett's Cove, it has occurred to me that there may possibly be some relationship between the glacial beds of the latter and the mudstones which occur in an isolated patch in the Inman Valley. The peculiarity of this formation attracted the attention of Mr. Brown, the Government Geologist, who thought it might be an outlier of the Jurassic rocks of the Leigh's Creek district, and under his advice the Government has bored through nearly a thousand feet of these beds prospecting for coal without reaching the bed rock. Evidences of glacial action are not wanting in this district. Granite boulders of great size can be traced from the Bluff, as a radiating centre, up the Inman Valley for miles. As far back as 1859 Mr. A. R. C. Selwyn reported as follows :—"At one point in the bed of the Inman I observed a smooth striated and grooved rock surface, presenting every indication of glacial action." Although this spot has, unfortunately, not been rediscovered, it is not likely that so good a field geologist as Mr. Selwyn should have been deceived in his observations. Mr. H. Y. L. Brown in his report (1892) describes these undetermined deposits in the following terms :—"This formation consists of a jointed shale, varying in color from a bluish-green to black, and interstratified with them there are undulatory beds of sandstone and quartzose sandstone, and occasionally limestone of irregular thickness. The upper portion of this shale, which in some places exhibits a concretionary structure, has become decomposed into clay, and contains water-worn pebbles and boulders of granite, quartzite, sandstone, ironstone, &c. Some of the boulders of granite are of great size, and in character resemble the granite of Victor Harbor." I think from the evidences before us it is not improbable that these anomalous beds of the Inman Valley may prove to be of the same character and age as the Hallett's Cove and Bacchus Marsh glacial formations.

The Source of the Ice.

A word may be said, in conclusion, as to the probable source from whence the ice originated. In view of the extremely low

latitude of Hallett's Cove, which agrees with North Africa and the southern shores of the Mediterranean in the opposite hemisphere, we might have fallen back on the iceberg theory if the features had been reconcilable with such an hypothesis. This, however, is inadmissable. Berg ice could not possibly polish and groove hard rocks over extensive areas, whilst maintaining definite lines of erosion and striæ, such as occur at Hallett's Cove. The polished floor near the coast is indeed a huge *roche moutonnée* in the form of a ridge, with an elevation of about 20 ft., presenting uniform lines of glaciation on all sides. I am led to think that only terrestrial ice of great thickness and operating through a long period could produce effects such as have been referred to. Again, as far as can be judged at present, the morainic matter has been gathered from local, or at least South Australian, sources. Moreover, most of the beds are distinctly stratified (which could scarcely be expected of iceberg *debris)*, and in their deposition show thin, alternating beds of different lithological character indicating the presence of water operating under quiet conditions. Lastly, in the absence of organic remains the proof is wanting that the Hallett's Cove beds are of marine origin, for whilst many of the clay bands are eminently adapted for the preservation of such, no fossils have hitherto been discovered in them. The land plants of the Bacchus Marsh beds seem to point to fresh-water conditions in analogous formations in the adjoining colony, and I should anticipate a greater probability of finding similar remains in the Hallett's Cove beds than a marine fauna. There seems to be only two suppositions which could offer adequate conditions for the glaciation of Southern Australia. Either a much higher altitude of the land, with the main mountain systems restored to the height they possessed before suffering the waste undergone during the enormous period separating Palæozoic times from the present ; or the extension of the Antarctic Continent and ice-cap into lower latitudes, with the physical contour of the land such as to deflect the Antarctic currents to our shores, so that Southern Australia would be climatically much nearer the Southern Pole than it is to-day. Either of these factors—or, perhaps, both conjointly—may have supplied the efficient cause of that refrigeration of climate in South Australia, the evidences of which we have discussed to-night.

Petrographical Observations upon some South Australian Rocks.

By J. Collett Moulden, Associate Royal School Mines, London.

Communicated by J. East, F.G.S.

[Read May 7, 1895.]

Through the kindness of Mr. J. J. East, F.G.S., Registrar of the School of Mines and Industries, Adelaide, I have been enabled to examine a small series of rocks, chiefly South Australian, from the collection of that Institution, and the following observations on them may prove of interest.

In each case, thin sections for examination under the microscope were cut, and the component minerals of the rock, its nature, structure, and texture were examined.

The sections number 20 in all, and some possess many points of interest.

The contributions to the Petrography of South Australia have, in the past, been very meagre—the harvest indeed is rich but the reapers few—and the few notes herewith appended will, I hope, merely serve to point out the great desirability of such work being actively pushed forward in the near future.

I wish it to be quite understood at the outset that these rocks have been named on petrographical grounds, combined with a microscopic examination of the hand specimens. I have, unfortunately, at present, no opportunity of studying these examples in the field, and knowing what a terrible stumbling-block in geology the nomenclature of rocks is, one may easily conceive that some of the names may have to be slightly modified after an examination of the rocks *in situ*. Even under such circumstances the names to be applied to them is greatly a matter of individual opinion.

The localities of the rocks are mostly well known and authenticated—some, indeed, were personally collected by Mr. East—and these circumstances render it the more desirable that reliable information should be forthcoming concerning them. In some cases the specific gravity of the rocks was taken by means of a Walker's balance.

I. Olivene Basalt, Mount Eden, Auckland, N.Z.

The rock consists of *plagioclase*, *olivene*, and *magnetite* in grains, with a fair amount of *augite*. The olivene is fresh, gives the usual splendid polarisation-colors, and has the usual irregular

cracks. The plagioclase is in lath-shaped crystals in the base. The olivene crystals are corroded by the magma. The felspar microliths in the base show the flow-structure well. The augite encloses some dark grains, undetermined. The whole mass is rather scoriaceous in character, so the specific gravity was not determined. It is quite a typical olivene basalt.

II. Olivene Basalt, Mount Gambier, S.A.

The minerals composing this rock are—*Olivene* in rounded grains, cracked and a good deal corroded by the magma; they are fresh and clear. *Augite* of a brownish-green color, fresh and giving good polarisation colors; it is allotriomorphic. *Plagioclase felspar* in lath-shaped clear crystals in the ground mass. *Magnetite* is plentiful in the usual black grains scattered throughout the mass. The sp. gr. of the rock = 2·73, which is rather low due perhaps to the presence of cavities and gas-holes. It is a fine grained typical rock, and shows flow-structure.

III. Olivene Basalt, Kangaroo Island.

This exceedingly interesting rock consists of *plagioclase felspar*, both as porphyritic crystals and as the usual laths in the base. The former at times show most beautiful zoning and inclusions, with the usual lamellar twinning of plagioclase.

Augite is plentiful. It is, curiously enough for a basalt, quite clear and colorless, and well-twinned in some crystals, while others exhibit good "hour-glass" structure. Owing to its being colorless and having such a high refractive index, it is not always easily to be distinguished from some of the olivene present.

Olivene occurs as fresh and clear grains corroded by the magma, while *magnetite* is abundant in the usual black grains.

Felspar and augite are the most abundant constituents, then olivene, and lastly magnetite. The rock is typically ophitic in structure, and there is a good deal of glass of a dirty brown-green color in the base, which is quite isotropic. The rock is a very basic one in character, as may be guessed from the mineral components, and it has a sp. gr. of 2·88. The rock is not holocrystalline, but it has otherwise rather the character of a dolerite (ophitic), but I have called it a basalt since I have no information as to its field occurrence, but since the specimen was labelled "Columnar Diorite," I presume it must exist as a lava flow. If, however, it occurs as a dyke-rock, dolerite might perhaps be applied to it as a name rather than basalt. This seems to have been the rock noted by Dr. Chas. Chewings.* The most important and perhaps also the most valuable feature of this

* "Beitrage zur Kenntnis der Geologie Süd und Central Australiens" (Petrographischer Anhang.), Heidelberg, 1894.

rock is that it is gold-bearing. The hand specimen in my possession shows a small speck of metallic gold imbedded in it. I do not know whether I am correct in so saying, but I believe this this to be the first recorded occurrence of gold in a volcanic rock for South Australia. Whether it really occurs as an original constituent or not it would be impossible to conjecture from the evidence at my disposal, but the field-occurrence is at least well worth an investigation. Supposing that it is not an original constituent, it is easy to understand how a lava flow in passing over auriferous sands or gravels might catch up and include some of the gold, as has been the case with the zircons occurring in the basalts of the Eifel District in Europe. On the other hand, if the basalt occurs as a dyke-rock,* the dyke may have intersected an auriferous quartz reef and caught up some particles of gold or auriferous quartz. The quartz, in the presence of such basic materials as compose this rock, would be corroded and finally dissolved away, leaving the gold as an included speck. It is curious that the speck should occur in such a small hand specimen as I have, the dimensions of which are not greater than about $2\frac{1}{2}'' \times 1\frac{1}{2}'' \times \frac{3}{4}''$.

The rock is fine-grained and compact. Another point of some interest is that, although it is a basalt, still the magnetite in it is not large in amount, and most of the minerals composing it are colorless, or nearly so. On one edge of the specimen and in one or two other places there are some reddish-brown clear minerals of high refractive index, which appear to be either garnet or zircon. As they do not appear in section it is very difficult to say which. The specimens of this mineral are not large, but are quite easily seen by the unaided eye.

IV. Axinite Amphibolite, Rosetta Head, S.A.

This is a very much altered rock, which consists mainly of *hornblende* and a perfectly colorless *augite*, the former largely predominating. Some *biotite* is present in minute crystals, with *quartz* and *chlorite* as accessories. It has been much altered, as evidenced by the chlorite, &c. The one great point of interest in this rock is the presence of a considerable amount of the mineral *axinite* as a rock-forming constituent, which occurs not only as allotriomorphic grains but also as idiomorphic crystals, which in section give most perfect lozenge or hatchet-shaped sections. In one part of the hand specimen there is a small druse or cavity,

* This rock was observed at Kingscote by Prof. Tate in 1881 and in the Freestone Range in 1883 ; it was reported a diorite intrusive in mica-schist in Trans. Roy. Soc., S.A., vol. vi., p. 122, 1883, and in the accompanying geological map its course is laid down, though by inadvertence was not prolonged to the sea-cliff at Kingscote.—[Editor.]

wherein there are some of the most beautiful and characteristic sharp-edged triclinic crystals of axinite of a brown-violet color, and whose edges, where broken, exhibit the curious serrated fracture of that mineral. These crystals are, roughly, from $\frac{1}{5}''$ to $\frac{1}{4}''$ across. In the section they are very pleochroic. Many of them show cleavage cracks parallel to 010 ($\infty P \breve{\infty}$) and the polarisation-tints are not high. If it occurs, as I imagine, in contact with the granite, which forms Rosetta Head, it can easily be understood that the conditions would be favorable to the occurrence of axinite. I am not aware that axinite has before been recorded for South Australia, though Liversidge ["Minerals of New South Wales," p. 183] has recorded it for that colony.

The zircons seen in the section of this rock are very good. Taking it on the whole, axinite-amphibolite seems the most suitable name for it. The augite is frayed and bent in places.

V. Epidote Rock, Wooltana, Far North Ranges.

Epidote of a greenish-yellow color and with high refractive index, for the greater part, composes this rock, which is exceedingly compact, fine-grained, and has a sp. gr. of 3·18. It seems rather altered and does not show much pleochroism. The hand specimen on one side shows some of the characteristic pistachio-green epidote. Magnetite in irregular grains is scattered throughout the mass There is a mineral, probably secondary quartz, filling up interstitial spaces. In mass it is of a very dark-green color and heavy. In the section the epidote appears to be quite granular, and it makes up by far the larger part of the rock, which seems to present no particular feature of interest.

VI. Altered Amphibolite (with Epidote), Hale River, lat. 23° 40′ S.

This is composed chiefly of *hornblende*, with the usual 120° cleavage cracks; some of the hornblende is twined. It contains also a good deal of hornblende altered to *chlorite* and *epidote*. The epidote fills up the cracks. A little secondary *augite* is present.

Some parts of the section appear greatly clouded. Its polarisation-colors are most beautifully bright and the whole mass is greatly altered. The sp. gr. = 3·10.

It is holocrystalline and the texture inclines to coarse. It is an amphibolite which has undergone change.

VII. Altered Diorite, Hale River, lat. 23° 40′ S.

This rock is a diorite, which has been somewhat altered. It is composed of *hornblende*, showing splendid cleavage cracks inter-

secting at about 120°. Some of this mineral has undergone chloritic change. *Plagioclase* polysynthetically twinned and altered ; *epidote* in fair grains as an alteration product ; secondary colorless *augite*, sparingly ; secondary *quartz*, which is very clear and contains liquid enclosures ; and *apatite* which is rather abundant in grains. Some *sphene* is also present as an accessory. It has a sp. gr. of 3·03.

The whole rock has been a good deal crushed and indicates a tendency to become schistose.

VIII. Augen Gneiss, Florence River "Ruby" Field, Central Australia.

This gneiss is composed of a good deal of *biotite*, which is very pleochroic ; *plagioclastic felspar*, beautifully twinned and clear, the twin lamellæ show intense strain and bending, and in fact the whole rock has been much strained and shorn ; *quartz*, forming a mosaic with felspar ; *microcline* containing *apatite (?)* as needle-like inclusions ; *garnets* of a clear pink color, surrounded by *biotite* and some greenish alteration products ; *epidote(?)* with high polarisation colors. The garnets are isotropic. Some of the felspar contain some ramifying masses of calcite as a secondary infilling. A little rutile is present as an accessory constituent. The rock has a sp. gr. of 2·75 and has a perfectly gneissose structure. Zircons in small crystals are present, as is often the case in these rocks. It is an augen-gneiss with garnet.

IX. Garnetiferous Gneiss, from same locality as No. VIII.

The minerals present are as follows :—*Plagioclase felspar*, showing splendid lamellar twinning ; one piece shows both the albite and pericline types combined ; it is fairly clear. *Orthoclase felspar* is present ; *quartz* in plenty, also as an inclusion in the garnets present ; *biotite* in plenty ; *garnets* of a beautiful pink color are abundant in the slide and hand specimen, they are irregularly cracked across and are full of cavities and inclusions, are quite isotropic and show no anomalous optical characters. *Rutile* is present as an accessory mineral ; crystals of light yellow and of a dark red are present, both as simple prismatic forms and as geniculate twins. The geniculation angle of one of the latter was found to be 114° 30′ (this angle is given by Rosenbusch as 114° 25′). In some cases the rutile occurs as an inclusion in biotite, while in one case it occurs in garnet. *Apatite* occurs, both as fairly large prisms in felspar and as long needle-like forms ; *zircon* is moderately abundant as an accessory in small colorless crystals with dark borders, due to the high index of refraction.

The whole rock is typically metamorphic, has a sp. gr. of 2·83 and is rather coarse-grained.

X. Syenite Porphyry,* Yardea, Gawler Ranges.

This rock, which has been a good deal altered, is composed of a felsitic ground-mass of a brown color, in which occur porphyritic crystals of *felspar*, greatly altered and clouded. This felspar polarises in low tints, and much resembles soda-orthoclase. *Augite* is present as a porphyritic constituent, the crystals of which have been much altered, with separation of brown iron-oxide, especially along the cleavage cracks. There is a blue mineral, with high refractive index and quite unaltered, present in the ground-mass in tiny granules, which I have not been able to determine (corundum ?). *Apatite* is present as an accessory. The felspars show secondary growth very well. The rock has a sp. gr. of 2·63, is very hard and compact, and tends to break with a splintery and rather conchoidal fracture; it may be an anorthoclase syenite porphyry.

XI. Biotite Granite (from an erratic boulder), Hallett's Cove, S.A.

This rock is a coarse-grained granite. The hand specimen is a small one and rather weathered. It consists of *felspar*, *orthoclase*, with a little *plagioclase*, cracked, clouded, and altered; *quartz* in plenty, containing liquid cavities; *biotite*, a good deal altered and darkened. The texture is coarse and the structure typically granitic.

XII. Coarse Muscovite Granite (Pegmatite), Mount Gawler, near Port Lincoln, S.A.

This is a much decomposed rock of a very coarse texture. The felspar has nearly all passed to kaolin, the plates of muscovite are turning silvery-white, and losing their transparency and elasticity. The quartz is abundant and, of course, unaltered As this rock was so decomposed and presented no particular features of interest, no section was cut, but the foregoing notes were made from an examination of the rock specimen itself. It is an exceedingly acidic rock.

XIII. Biotite Granite (red), Murray Bridge, S.A.

This granite, which is coarse-grained, consists of *orthoclase* and *microcline*, the latter showing microperthitic structure; *plagioclase* well-twinned in lamellæ; *quartz* in large grains, which appear smoky in the hand specimen and in the section are seen to be full of beautiful liquid cavities with moving bubbles. *Biotite* is present in fair amount. *Apatite* occurs as an accessory con-

* *Vide* "Report on the Geological Character of Country passed over from Port Augusta to Eucla," H. Y. L. Brown, Adelaide, 1885. No quartz at all observable in my sections.—J.C M.

stituent; a basal section of this mineral shows the common hexagonal outline, the sides of which measure about $\frac{1}{16}''$ in length. Quartz and felspar are intergrown, forming micrographic structure. It shows no special characters beyond those noted, and is a typical granite, having a sp. gr. of 2·63.

XIV. Granite (Grey), Monarto, near Murray Bridge, S.A.

The section shows *orthoclase* in zoned crystals, *microcline* with the common "cross-hatching" well shown between crossed nicols. Some *plagioclase felspar* is likewise present. *Quartz* is fairly abundant and in some parts is intergrown with orthoclase, giving micrographic structure. Both *biotite* and *muscovite* are abundant and are intergrown. The biotite shows some pleochroic haloes around included crystals of zircon. *Zircons* are also present as inclusions in felspar and quartz, while apatite also occurs in some of the felspars. The hand specimen shows the rock to be fine grained and compact; the structure as seen from the slide is typically granitic.

XV.(a) Biotite Granite (with Microcline and Sphene), Palmer, S.A. (Collected by the author.)

This rock is a reddish granite and has a sp. gr. of 2·63. It consists of *orthoclase*, which has so intergrown with quartz in places as to give micrographic structure; *microcline* with very good cross-hatching visible between crossed nicols; *quartz* is abundant and contains liquid enclosures. The felspars are clouded and altered somewhat. *Biotite* is in plenty and some of the pieces show pleochroic haloes around included crystals of zircon. As accessory minerals are present—*zircon* in moderate sized prisms; *apatite* in prisms and larger sections; *sphene* and *ilmenite* are pretty conspicuous, occurring sometimes together. The structure is quite granitic and the texture moderately fine. The plagioclase is, as usual, at once seen by reason of its prominent lamellar twinning. A fair amount is present.

XV. Biotite Granite, Kaiserstuhl, Tanunda, S.A.

This rock is made up of the following minerals:—*Quartz* abundant, showing micrographic structure with felspar in places. It forms a good "mosaic" owing to the rock having been crushed. *Orthoclase* and *microcline* in plenty; the "cross-hatching in the latter is very well developed indeed. *Plagioclase* is present in fair quantity, and in places it includes mica. The felspars are clouded and altered. The micas present are *biotite* and *muscovite*, the former in excess of the latter. They are crushed, frayed, and bent, and the muscovite is intergrown with the biotite in places.

The rock in structure and texture is almost identical with No. XV.(A), but it is crushed and has a metamorphic appearance. Apatite is present as an accessory constituent, as also are ilmenite, sphene, and zircon, though sparingly. The felspars appear to have been crushed. The sp. gr. was found to be 2·62.

XVI. Biotite Granite, Port Victor, S.A.

This rock is a coarse-grained grey granite, compact and hard. It consists of the following minerals:—*Quartz*, very conspicuous in good-sized masses both in the hand specimen and the slide. It has a curious blue color and opalescent appearance, and, in section under the $\frac{1}{4}''$ objective, shows some liquid enclosures, though they are not nearly so large or so abundant as in the quartz of No. XIII. The felspar is mostly *orthoclase*, sometimes well-zoned; but *plagioclase* is also present, as shown by lamellar twinning. The predominant mica is *biotite*, but a little *muscovite* is also present. *Zircons* in small crystals occur as accessories in some of the biotites, while the hand specimen shows some small spots and grains of *pyrites*. The liquid cavities in the quartz contain moving bubbles in some places. The rock is altogether a typical granite, the most curious feature of which is the "blue" quartz resembling that of the Norwegian "Rumburgite." Some of the felspars show good secondary growth.

XVII. Obsidian "Bombs" (2), Stuart's Creek, Lake Eyre, S.A.

These two specimens are types of the "bombs" which occur in so many parts of Central Australia. They appear to have been slightly water-worn. Their origin is, as yet, quite unknown. They consist of a brownish volcanic glass, which in section gives no trace of devitrification—a perfect natural glass in fact. From determinations upon some nine specimens in my possession, the mean specific gravity is about 2·44. The glass fuses before the blowpipe without intumescence and in the closed tube it affords no water. When sliced through, it shows a compact interior, with merely one or two steam holes or cavities not much larger than pin-points. I add no more at present, as I hope to investigate them more fully in the future.

XVIII. Garnetiferous Gneiss, Block 10 Mine, 315-ft. level, Broken Hill, N.S.W.

This rock rather approaches a schist in its character. It is tough and compact, and has a sp. gr. of 2·71. It contains *quartz* in plenty. A good deal of *orthoclase* and *biotite* are also present. *Garnets*—both pink and green—form a fair amount of the rock; they are quite isotropic between crossed nicols. *Muscovite* and altered mica are present with the biotite. There is an accessory

constituent to be seen in the slide which is difficult to determine. It is rather like cordierite and is surrounded by alteration products, but it has rather a higher index of refraction than ordinary cordierite. The rock is moderately fine-grained and in parts has quite a pinkish color from the number of garnets present.

XIX. Tremolite Schist (with Garnets), Block 10 Mine, 1,450 ft. Level, Broken Hill, N.S.W.

This rock is of a schistose character. The hand specimen shows *tremolite*, *garnet*, and *biotite*. *Quartz* and *orthoclase* are present in grains; also garnets, which are cracked, drawn out, and are not isotropic, but show anomalous double refraction due to strain. *Biotite* is present, which is rather altered. It is also crushed and bent. *Tremolite* forms a large part of the rock, which is a good deal altered, rather friable, and has a sp. gr. of 2·94. *Muscovite* altered to a hydromica is present as a constituent. The garnets and biotite form layers in the mass. Many of the garnets, which are of a light pink color, are quite long and rolled out. The rock has undergone great strain.

The foregoing observations are perhaps little more than cursory remarks upon the specimens in question, but I hope they will suffice to indicate their general composition and character. Nos. II., III., IV., VIII., IX., XVI., and XVII. seem to present the most interesting points.

In conclusion, I have to acknowledge the kindness of Prof. J. W. Judd, F.R.S., who has afforded me, not only the opportunity of doing this work in the Geological Laboratory of the Royal College of Science, London, but every aid and facility for the carrying out of the same. The sections were cut by Mr. F. Chapman of the same institution.

A Supplement to a Census of the Flora of Extra-Tropical South Australia.

Compiled by Professor Ralph Tate.

[Read December 3, 1894.]

Now, after a lapse of a little more than five years, so many additions have been made to the "Census" published in these Transactions, Vol. XII., pp. 67-128, 1889, that it has been thought desirable to issue a supplemental list, and to include therein the emendations to the list of 1889.

The number of species has been increased by eight, but as five species have been eliminated from the "Census," the total gain is 76, making a grand total of 2,011. By these accessions one natural order, *Eriocauleæ*, and six genera, *Elacholoma*, gen. nov., Or. Pedalineæ, *Beaufortia*, *Eriocaulon*, *Phylloglossum*, *Psilotum*, and *Lygodium*, are now included in the "Census." Of the 81 additional species, 29 are new to science and 52 are extra-limital. The greater number of the additional species occur in the Eremian Region, and are largely the results of the expedition by Mr. Tietkens in 1889 (see Trans. Roy. Soc., Vol. XIII., pp. 94-109, 1890), of the Elder Expedition in 1891-2, and of the Horn Expedition in 1894 (the botanical results of which are not yet published). In the South-East extremity of this colony Mr. Eckert has discovered several Victorian species previously unknown on the western side of the Glenelg River, a number of the species are recorded in "Report Australasian Association for the Advancement of Science," Vol. V., p. 410, 1894, and the rest have been communicated by Baron F. von Mueller, who has also informed me of other provincial gains derived from other sources.

The following schedule summarises the general nature of the accessions, their distribution, and sources of information :—

Collectors.	New. Genera added.	Known.	Species added. New.	Known.	Total.
Eremian Region—					
Tietkens Exped. ...	–	1	8	11	19
Elder Exped. ...	–	–	2	4	6
Horn Exped. ...	1	1	8	14	22
Unparticularised ...	–	2	9	8	17
Euronotian Region—					
Eckert	–	1	–	11	11
Unparticularised ...	–	–	2	4	6
Totals ...	1	5	29	52	81

The index letters to the several districts are correspondingly those employed in the "Census" of 1889; but District F has been reduced, as the result of personal knowledge gained while attached to the Horn Expedition, by the extension of District C to about the latitude of Engoordina on the Finke-river.

The asterisk prefixed to the species-name indicates that the species represented is new to science.

I. Addenda.

*Capsella villosula, *F. v. M.* and *Tate, m.s. S.*, Arkaringa Valley, *Elder Exped.*

Capsella ochrantha, *F. v. M.*, subsequently regarded by that author as a yellow-flowered variety of *C. cochlearina;* but as it offers other trivial differences, which seem to be constant, it should be maintained as distinct. F, *Tietkens.* C, Arkaringa Valley, *Elder Exped.*

*Eriostemon argyreus, *F. v. M.* and *Tate* in Trans. Roy. Soc., S. Aust., vol. XIII., 1890. F, *Tietkens.*

Plagianthus pulchellus, *Gray.* G, *Eckert*, fide F. v. M. in Aust. Ass. Adv. Sc., vol. V., p. 140.

*Sida podopetala, *F. v. M.* and *Tate*, op. cit. F, *Tietkens, Horn Exped.*

Triumfetta micracantha, *F. v. M.* F, s.-w. of Finke-river, *Schwartz*, fide F. v. M.

Euphorbia Mitchelliana, *Boissier.* F, Tempe Downs, *Horn Exped.*

Claytonia spergularina, *F. v. M.* F, Finke-river, *Horn Exped.*

Scleranthus biflorus, *J. Hooker.* G, *Eckert*, op. cit.

Atriplex elachyphyllum, *F. v. M.*, in Frag. VII., p. 8, 1870; and Icon. Salsolaceæ, tab. 6. C, Crown Point and Adminga Creek, *Horn Exped.* S, Lake Weatherstone, *Tate.*

*Atriplex lobativalve, *F. v. M.*, in Icon. Salsol., tab. 6; and Vict. Nat., 1893. F, Marshall-river, *Winnecke.*

*Bassia Luehmanni, *F. v. M.*, in Vict. Nat., 1890; and Icon. Salsol. F, near Finke-river, *Schwartz.*

*Bassia Tatei, *F. v. M.*, in Vict. Nat., 1890; and Icon. Salsol. S, Lake Torrens Plain, east, *Tate.*

*Bassia longicuspis, *F. v. M.*, in Icon. Salsol., tab. 24; and Vict. Nat., 1893. C, Charlotte Waters, *Kempe.* S, Beltana, *Mrs. Richards.*

Threlkeldia proceriflora, *F. v. M.* C, Adminga Creek, *Horn Exped.*

Daviesia latifolia, *R. Brown.* G, *Eckert*, fide F. v. M.

Casuarina nana, *Sieber.* G, *Eckert*, fide F. v. M.

Crotalaria Novæ-Hollandiæ, *DeCondolle.* F, *Horn Exped.*

*Swainsonia cyclocarpa, *F. v. M.*, in Vict. Nat., 1892. F, MacDonnell Range, *Schwartz.*

Swainsonia canescens, *F. v. M.* F, MacDonnell Range, *Horn Exped.*

Acacia patens, F. v. M. F, *Kempe*, *Tietkens*, *Horn Exped.*; C, *Horn Exped.*

Acacia Meissneri, *Lehmann.* W, Fowler-Bay-district, *Tate.*

*Acacia frumentacea, *Tate*, *m.s.* F and C, Charlotte Waters and northward to Mount Sonder, *Horn Exped.*

*Acacia Cowleana, *Tate*, *m.s.* F, *Horn Exped.*

Acacia Bynoeana, *Bentham.* F, *Tietkens.*

Pimelea collina, *R. Brown.* G, *Eckert*, op. cit.

*Pimelea Husseyana, *F. v. M.*, *m.s.* A, Port Elliot, *Miss J. L. Hussey.*

Grevillea parviflora, *R. Brown.* G, *Eckert*, fide F. v. M.

Grevillea eriostachya, *Lindley.* F, *Horn Exped.* and (as G. chrysodendron) *Tietkens.*

Ammannia auriculata, *Will.* F, *Tietkens* and *Horn Exped.*

Leptospermum flavescens, *Smith.* G, *Eckert*, op. cit.

Melaleuca Leucodendron, *Linne.* C, between Eyre's Creek and Hergott, *fide F. v. M.*

Beaufortia elegans, *Schaur.* W, near Eucla, *G. R. Turner*, com. by F. v. M.

*Eucalyptus Lansdowneana, *F. v. M.* and *J. E. Brown* in "Forest Flora, S.A." W, Gawler Range.

Eucalyptus eudesmoides, *F. v. M.* F, *Horn Exped.*; C, Everard Range, *Elder Exped.*

Pomaderris vaccinifolia, *Reisseck* and *F. v. M.* A, Mount Lofty Range, *fide F. v. M.*

*Didiscus Gillenæ, *Tate*, *m.s.* F, Mount Gillen, *Horn Exped.*

Oldenlandia galioides, *F. v. M.* F, *Tietkens.*

Coprosma Billardieri, *Hooker.* G, *Eckert*, op. cit.

*Wedelia Stirlingi, *F. v. M.* and *Tate*, *m.s.* F, *Horn Exped.*

Aster orarius, *F. v. M.* G, near Glenelg River, *fide F. v. M.*

Vittadinia scabra, *DeC.* F, *Horn Exped.*

Calotis dentex, *R. Brown.* F, *Horn Exped.*

*Calotis latiuscula, *F. v. M.* and *Tate*, 1890. F, *Horn Exped.*; C, *Tietkens.*

Pluchea squarrosa, *Benth.* F, *Horn Exped.*

Erechthites lacerata, *F. v. M.* F, *Tietkens* and *Horn Exped.*; C, Everard Range, *Elder Exped.*

*Helipterum Jesseni, *F. v. M.*, in Vict. Nat., 1890. C, S, W, M, A, N, L.

*Helipterum Troedelii, *F. v. M.*, in Vict. Nat., 1890. S, Lake Torrens Plain east, *Tate.*

*Helipterum Fitzgibboni, *F. v. M.*, in Vict. Nat., 1890. F, *Thornton*, Kempe. C, *Tietkens*, *Horn Exped.*; W, *Batt.*

*Helichrysum phaceloma, *F. v. M.* and *Tate*, *m.s.* F, *Horn*

Exped. C, Everard Range, and also Cavenagh Range, W.A., *Elder Exped.*

*Goodenia Horniana, *Tate* and *F. v. M.*, *m.s.* F, George Gill's Range, *Horn Exped.*

*Goodenia subintegra, *F. v. M.*, in Vict. Nat., 1888, p. 12, previously included under *G. glauca.* F, C, Y.

*Goodenia fascicularis, *F. v. M.* and *Tate.* C, *Tietkens.*

*Ipomœa racemigera, *F. v. M.* and *Tate.* F, *Tietkens, Horn Exped.*

Polymeria ambigua, *R. Brown.* F, "region at the tropic of Capricorn," *F. v. M.*

Halgania integerrima, *Endlicher.* F, *Tietkens.*

Cynoglossum latifolium, *R. Brown.* G, *Eckert*, op. cit.

Styphelia Mitchelli, *F. v. M.* F, Mount Sonder, *Horn Exped.*

*Teucrium grandiusculum, *F. v. M.* and *Tate.* F, *Tietkens.* C, Birksgate Range, *Elder Exped.* W, Ooldea, *Tate.*

*Prostanthera Schultzii, *F. v. M.*, *m.s.* F, Mount Sonder, *Schultz, Horn Exped.*

*Elacholoma Horni, *F v. M.* and *Tate*, *m.s.* F, *Horn Exped.*

Newcastlia chrysotricha, *F. v. M.* C, Everard Range, *Elder Exped.*

Eremophila viscida, *Endlicher.* C, *Tietkens.*

Pterostylis Mackibbini, *F. v. M.*, in Vict. Nat., 1892. A, near St. Vincent Gulf, *F. v. M.* (1848).

*Prasophyllum Fitzgeraldi, *Dean*, *m.s.* A, Mount Lofty, *Fitzgerald.*

Xerotes sororia, *F. v. M.* A, St. Vincent Gulf, *F. v. M.*

*Xanthorrhœa Thorntoni, *Tate*, *m.s.* F, *Horn Exped.*

Juncus Brownii, *F. v. M.* G, *Eckert*, op. cit.

Triglochin calcitrapa, *Hooker* (= T. centrocarpa, pars). F, C, *Horn Exped.*

*Eriocaulon graphitinum, *F. v. M.* and *Tate*, *m.s.* F, *Tietkens.*

Fimbristylis acuminata, *Vahl.* F, *Tietkens.*

Heleocharis capitata, *R. Brown.* F, Palm Creek, *Horn Exped.*

Triraphis pungens, *R. Brown.* F, *Horn Exped.*

Triraphis bromoides, *R. Brown.* C, *Elder Exped.*

Phylloglossum Drummondii, *Kunze.* G, *Eckert*, op. cit.

Psilotum triquetrum, *Swartz.* F, George Gill's Range, *Horn Exped.*

Lygodium reticulatum, *Schkuhr.* F, *fide F. v. M.*

Adiantum hispidulum, *Swartz.* F, George Gill's Range, *Horn Exped.*

Asplenium Trichomanes, *Linn.* G, *fide F. v. M.*

Aspidium unitum, *Swartz.* F, George Gill's Range, *Horn Exped.*

Aspidium aculeatum, *Swartz.* G, *fide F. v. M.*

II. Corrigenda.

Hybanthus miniatus in list of Tietkens' plants is a mere *lapsus calami* for *H. aurantiacus* = *H. enneaspermus.*

Geijera salicifolia, *Schott*, is not that species, but *G. pendula*, Lindley, which by F. v. M. is reduced to a variety of *G. parviflora.*

Micrantheum hexandrum, *Hooker.* The South Australian plant, quoted under this name, is a distinct species and has been described by F. v. M., in Vict. Nat., 1890, as *M. demissum.*

Phyllanthus minutiflorus in the Tietkens'-collection proves to be immature *P. rhytidospermus.*

Atriplex holocarpum, *F. v. M.*, is a variety of *A. spongiosum.*

Kochia pentatropis, *Tate*, is now reduced to *K. decaptera.*

Bassia Cornishiana, *F. v. M.*, is reduced to a varietal state of *B. Birchii*, F. v. M.

Bassia bicuspis, *F. v. M.*, is a somewhat aberrant form of *B. tricuspis.*

Gomphrena Brownii, *Moquin*, is a synonym of *G. lanata*, Brown.

Lespedeza lanata, *Bentham*, is not actually known within extra-tropical South Australia, "but reaches near to the boundary," *F. v. M.*

Eremophila Tietkensi, *F. v. M.* and *Tate*, is only a broad-leaved canescent variety of *E. Latrobei.*

Crinum angustifolium, quoted from the Macdonnell Range, belongs to *C. flaccidum.*

Crinum pedunculatum from the River Murray region belongs also to *C. flaccidum.*

Thelymitra rubra, *Fitzgerald*, is identical with *T. Macmillani*, F. v. M., which is the older name.

Descriptions of New Species of Marine Mollusca of South Australia.

By Jos. C. Verco, M.D., Lond., &c.

[Read May 7, 1895.]

Murex Tatei, *spec. nov.* Pl. ii., fig. 2, 2a, 2b.

Shell squarely pyriform, light, porous. Spire less than one-third the length of the shell. Nucleus conspicuous, papillate, one turn and a half, smooth, deep purplish-black, suture somewhat channelled.

Spire-whorls four, convex, roundly shouldered at the upper part; varices not quite regularly disposed, some continuous with those on adjacent whorls others not, well marked, breadth rather greater than height, rounded and reflected slightly, most prominent above the shoulder. Regularly disposed spiral liræ; six on the penultimate, fewer on the posterior whorls, about as high and as wide as the interspaces. These are completely covered with very regular thin close-set erect longitudinal laminæ, very uniformly corrugated, so that between the liræ they are straight, and on the liræ are semicircular, with the convexity to the right. These semicircular corrugations are so uniform that their sides, which touch, seem to form thin spiral vertical plates with a longitudinal scalloping between, giving the shell an appearance of being covered with coral, or chain-stitch crochet work which is continuous over the varices.

Body-whorl ventricose, roundly angulated at upper part, nearly flat above this, sloping with slight convexity below, markedly contracted at midpoint between the suture and anterior extremity of canal. Varices five, about one to one and a-half lines wide and a line high, highest behind the shoulder. About 20 spiral liræ, alternately higher and lower, covered with the same crenulated longitudinal laminæ as the spire. Aperture obliquely oval, very slightly contracted anteriorly. Outer lip simple, finely crenulated, and lirate for a line within. Outside thickened to two lines by about nine superposed scallopings, corresponding with the crenulations of the lip. Inner lip distinct, on the arcuate columella, continuous behind with the outer lip, smooth, thin, inflected at the lower part of the aperture, so as to partly cover the canal. Canal slightly longer than the aperture, nearly straight, deflected first to the left, then straight, then to the left, almost closed; shortly and sharply recurved at the an-

terior extremity. Color greyish-white. Reddish-brown inside from suture to shoulder, indistinctly visible outside in the interstices of the crenulations. Operculum horny, nucleus apical, anterior.

Length, 15 mm.; breadth between the varices, 7·5—including them, 9·5. Length of aperture, 5 ; breadth, 3 ; of canal, 6 ; of spire, 4 mm. One broken shell has an aperture of 5·5 mm. long, and a canal of 8 mm.

No Murex known to me so resembles it as to require a diagnosis.

Habitat.—Backstairs Passage, S.A. Dredged in 20 fathoms, one alive ; 17 fathoms, one alive immature ; 22 fathoms, one recent ; ? depth, seven dead, three recent *(J. C. Verco)*.

Type specimen in my collection. I have named it after the well-known President of the Royal Society.

Murex (Poropteron, *Jousseaume*, 1880) **robustus,** *spec. nov.* Pl. ii., figs. 3, 3*a*.

Shell ovate trigonal, solid, spire not quite so long as body whorl. Whorls six, exclusive of nucleus. Nucleus slightly papillate one and a-half turns, dextral. Spire-whorls subconvex, nearly smooth. Sutures distinct, simple. Varices three, regular, almost continuous, each just behind that on the previous whorl, and ending posteriorly in a sinuous, stout, roundly-trigonal tube, directed towards the apex of the shell. On the left side of the varices are short, stout, spiral buttresses, three on the penultimate, from the lower suture to the base of the tube behind. Body-whorl convex, scarcely shouldered above. Varices three, low and stout, ending close to the suture in a tube, trigonal in section, stout and sinuous, like a horn, extending backwards, hollow, rugose, and showing the scar of closure, just to the left of the anterior edge. Surface of whorl rather rugged, with five or six obsolete spiral liræ, and sublenticular very fine, incised, longitudinal growth-lines. Aperture oval, slightly oblique, small, entire ; peristome projecting as a thin, detached, simple, sharp lamina, from $\frac{1}{4}$ to $\frac{1}{2}$ mm. On the outside of the outer lip are six rounded, tubular, spiral ribs, extending to the margin of the varix (forming the "buttresses" of the varices on the spire) ; the most anterior is very short, and ends in the scar of the canal. Columella invisible. Canal completely closed ; length just longer than the aperture ; at its anterior end bent at a right angle, and then curved slightly to the right, with a capillary opening from a little behind the bend to the extremity, numerous fine, incised, longitudinal sinuous lines on its basal aspect. Labial varix saw-like, with nine forward-curved, claw-like processes ; the central ones terminate the obsolete spiral liræ of the whorl, and from

their under surfaces give off five of the buttresses of the apertural lamina. About five small tubercles continue the series posteriorly on the proximal part of the variceal tube. Operculum horny, ovate, nucleus apical anterior. Ornament, in very young specimens, a chestnut-brown spiral line at the base of the variceal tube, and a second about the level of the lower end of the aperture.

Length, 14·25; breadth, 5·5 between the varices, 7 including them; spire, 6; body-whorl, 8·25; length of aperture, 3; width, 2; length of canal, 3·75 mm.

Habitat.—Backstairs Passage, 22 fathoms, three alive, and St. Vincent's Gulf, dredge siftings, ? depth or exact locality, 25 dead and alive of various sizes *(J. C. Verco)*.

Type specimen in my collection.

It bears a superficial resemblance to *M. Angasi*, Crosse, but this is a narrower thinner shell, with a single curved (not sinuous) and open posterior variceal hook, an open anterior canal, and a simple aperture.

This shell resembles a *Typhis* in its sinuous posterior tube; but the variceal origin of the tube separates it from all the species of that genus, in which the canal is inter-variceal.

It differs from *T. triangularis*, A. Ads., in the absence of spiral liræ, and the closed straight canal. From *T. Japonicus*, A. Ads., = *T. arcuatus*, Hinds., in having no arched varices, no pseudo-varices, and its tubes not truncated From *T. cancellatus*, Sow., in the very narrow varices along the canal.

Trophon angustus, *sp. nov.* Pl. i., fig. 5, 5a.

Shell fusiform, sordid-white, lamellosely varicose; whorls six or seven, including the nucleus. Nucleus one turn and a-half, smooth, polished, blunt. Spire subturreted, whorls moderately convex, varices slightly higher than wide, six in each whorl; two or three broad obsolete spiral liræ, most marked just beyond the varices. Body-whorl slightly convex, contracted somewhat anteriorly; about five broad subraised spiral liræ, with two to five intervariceal longitudinal liræ, dividing the intervariceal areas into square spaces of varying size. Varices six, sinuous, posteriorly shortly convex to the right, straight in the middle, anteriorly openly and markedly concave to the right, in apposition over the dorsum of the canal; the last-formed rather higher than wide, but easily worn down; so that the earlier ones are wider than high, higher and narrower anteriorly. Aperture elongate-ovate, enamelled internally; outer lip varicose; columella arcuate, distinctly angled at junction with canal; inner lip thin, anteriorly slightly separate from columella, and very slightly curving over the canal; canal bent to the left,

moderately open, reflected, and notched. The shell has an inner hard enamel-like layer, and an outer of soft, porous, chalky consistence. This when perfect is nearly smooth, longitudinal and transverse markings being scarcely visible. When slightly denuded coarse and fine longitudinal lines become evident; when more denuded those are less marked and spiral ones are more manifest, numerous spiral incisions running along the broad liræ; and when the enamel only remains there are four or five subraised principal spiral liræ, with abundant fine interstitial striæ, but no longitudinal intervariceal markings.

Length, 10 mm.; breadth, including varices, 4·25 mm.; length of spire, 5; of aperture, 2·5; breadth, 1·5.

Habitat.—St. Vincent Gulf; dredged in deep water, three individuals *(J. C. Verco)*.

Type specimen in my collection.

From *T. Goldsteini*, Ten.-Woods, it is more slender *(T. Goldsteini* is 11·5 to 6, with the outer covering intact); varices are more arcuate and more approximate; whorls less angulate, less ventricose.

Trophon levis, *sp. nov.* Pl. ii., fig. 5, 5a.

Obliquely ovate-fusiform, thin, sordid-white. Whorls seven. Nucleus indistinct, one turn and a half, slightly excentric. Spire elevated, acute, shorter than last whorl, as 12·25 to 17·5. Whorls nearly flat, sloping, obtusely angulated at lower third, sutures indistinct, shoulder with distant tubercles vanishing about middle of penultimate whorl, most marked at its commencement. Body-whorl subventricose, uniformly rounded, somewhat constricted at the base; nine low, broad, rather rude longitudinal costations at irregular distances; obsolete broad flat spiral elevations, broadest and lowest about the periphery, narrower and more valid anteriorly, where also longitudinal incremental striæ are most marked; suture moderately distinct, irregular, crenulated in places by the ends of obsolete incremental lines. Aperture elongately oval, contracted posteriorly, opening widely into the canal in front; outer lip simple, thin, with wide shallow crenulations corresponding with the spiral liræ. Columella smooth, arcuate, slightly excavated; callus thin, spreading a little over the base, especially behind. Umbilicus rimate. Canal short, widely open, subsinistral, scarcely recurved, hardly notched. There is a complete, thin, soft chalky coating which smears and obscures the sculpture, but is evidently not an adventitious deposit. Three dark blackish-purple bands about a line in width visible inside the outer lip, in the posterior half of the aperture, the lowest one at its middle; two more, indistinct, at the junction with the canal, and two narrow and scarcely visible behind these. They lie between the spiral liræ. Operculum muricoid. Dentition, pl. iii., fig. 3, muricoid.

Length, 27·5 mm.; greatest breadth, 16 mm.; length of aperture and canal, 17·5 mm.; greatest width, 7 mm.

Habitat.—Backstairs Passage, S.A. Dredged alive in 22 fathoms; one example in my collection.

From *T. Flindersi* it differs by being much thinner, narrower, spire more acute, whorls less angulated, outer lip thin, not denticulated, columella not so excavated, umbilicus smaller, canal more open; surface much less sculptured. *T. Flindersi* is a littoral shell. *T. levis* was dredged in deep water. It is possibly only an extreme variety resulting from its very different station.

Triton mimeticus, *Tate* (Sipho?). Pl. 2, figs. 4, 4*a*.

In the Proc. Roy. Soc. of S.A. for June, 1893, p. 189, Prof. Tate described a shell which he referred provisionally to *Sipho*, recognising it as probably immature, and as needing further material to determine its generic location. This material has been furnished by two more specimens dredged by me in Investigator's Straits, one of which is slightly less immature than the type, and the other has formed two varices, and so established its position as a *Triton*. It is an interesting form in two respects, viz., the comparative length of its canal, and the delay in forming its first varix until about four and a-half whorls have been completed. I have given below a full description of the shell.

Shell ovately-fusiform, imperforate, rather thin. Whorls nearly six. Spire moderately elevated, one-third the length of the shell, as 7 to 21; whorls 5, including nucleus. Nucleus one turn and a-half, slightly oblique, apex nearly flat and forming a sharp angle with the short steep side in the first turn; second turn subconvex. Spire-whorls, the first slightly and medially angulated, the second with a marked shoulder at first median, but gradually approaching the suture, which it reaches about the middle of the third spire-whorl and runs in apposition with it for the third of a revolution, when the first varix is formed, and the suture sinks again to reascend just before the next varix is produced. Suture distinct. Whorls subconcave behind the shoulder, with spiral liræ, increasing in number with the size of the shell, about six in the penultimate and two interstitial threadlets; liræ rounded, narrow, about half the width of the interspaces; longitudinal growth-lines at unequal intervals, making the spiral liræ somewhat moniliform; obsolete longitudinal costæ, most marked at the angle, where they produce a row of tubercles, 15 on the penultimate whorl. Body-whorl large, angulation well-marked, with less pronounced carina in front, so as to divide the whorl into three equal parts; concave behind the angulation, flat and sloping to carina, excavated

anterior to this. Seven well-marked, acute, rounded tubercles on the shoulder on the dorsal aspect, none on the ventral, present but much less valid on the carina. Spiral liræ eleven behind the angle, eleven to carina, and 22 to end of canal; sublenticular growth-lines, no longitudinal costæ; ventral surface very flatly convex, shoulder obsolete, carina absent, no tubercles, liræ faint. Aperture obliquely oval, sharply marked off from the canal; columella arcuate, inner lip thin, distinct, joining outer lip behind, and forming a minute sinus with it by means of a small tooth-like spiral callus. Outer lip thickened by an ascending external varix, bevelled inside to a sharp margin, seven or eight teeth internally, the anterior three or four doubled.

Length of aperture, 8·5 mm.; breadth, 6·5 mm.; canal, 5·5 mm., almost closed, curved obliquely to the left, slightly recurved. Ornament, irregular rusty blotches, with articulated rusty spots on carina. Total length, 21 mm.; breadth, 11·25.

Habitat.—Dredged, Tapley's Shoal, 12-16 fathoms. One, immature, dead *(Mr. Matthews)*. Investigator's Straits, 15 fathoms, one dead; 20 fathoms, one immature, dead *(Verco)*.

From *T. Bassi* it differs by spire more acute, nucleus much smaller, more acute and angled, varix later formed (in *T. Bassi* after three or three and a-half turns), whorls more angled and tuberculate, canal longer.

Latirus aurantiacus, *sp. nov.* Pl. ii., fig. 1, 1a.

Shell ovate-fusiform, very solid. Spire elevated, shorter than the aperture. Whorls six, without the nucleus which is wanting; rather convex, roundly angled just below the middle, and provided with eight or nine rounded well-marked nodules, about equal in width to the intervals, and costate in the lower half of the whorls. Spiral liræ eight to ten, distinct, varying in size, devious, about equal in width to the interstices, and crossed by longitudinal rather distant scabrous lines of growth. Suture distinctly marginate, sinuous, ascending between the costæ, edge crinkled by imbricating growth lines. First and second whorls nearly destroyed by fine borings. Last whorl subventricose, shouldered at six lines from the suture, very slightly concave above, convex below, narrowing rapidly to its minimum at the middle point of the ventral surface; with nine very valid longitudinal costæ, flatly rounded, rather wider than the interspaces, highest at the shoulder, which abruptly points them, very slightly marked above the shoulder, gradually narrowing and subsiding below, to disappear at the middle of the base. Well-marked spiral liræ sub-equidistant (16 in the whorl), with an occasional spiral thread between the more distant (four in the whorl). Above the shoulder the liræ, five in number, are narrowest;

below it they gradually increase in size anteriorly, rounded, not quite as wide as the interstices. Whole surface roughened by close-set (two to the line) sub-vertical, imbricating, crinkled, incremental laminæ. Suture rather widely margined, sinuous, generally ascending between the costæ, conspicuously crinkled by longitudinal laminæ. Umbilicus small, partly covered by the inner lip, which is somewhat reflected into it, left margin slightly corrugated by varix of the notch. Columella nearly straight in its lower half; three distinct equal plaits, slightly oblique, the lowest corresponding with the prolongation backwards of the varix of the apertural notch. Aperture obliquely ovate, an inconspicuous narrow ascending posterior sinus formed by the marginate suture. Canal about one-third of the whole aperture, open, wide, slightly deviated to the left, notched anteriorly, very slightly recurved. Outer lip acute, thin, a little everted, due to incipient formation of a costa, crenated by the spiral liræ of the whorl, which also form sulcations within; internally of a deep salmon color at the margin, fading into the polished bluish white throat, and with somewhat darker red lines in the lirate depressions. Inner lip thin, a little spread over the columella, and partially occluding the umbilicus, of a glistening pearly-white color with a rusty tinge, especially between the plaits and near the upper part of the aperture. Ornament, a rusty salmon color most marked near the margin of the aperture, nearly hidden elsewhere by some green adventitious deposit. Operculum ovate, acute, nucleus at anterior apex.

Length, 46 mm.; greatest breadth, 27 mm.; length of aperture, 27 mm.; width, 10 mm.; of spire, 19-20 mm.

Habitat.—Backstairs Passage, S.A.; 18½ fathoms, dredged alive, one individual in my collection.

The shell most allied appears to be *L. concentricus*, Rve. My shell is not so thick, the costæ and liræ are more numerous and not so valid; the last whorl is longer relatively to the spire.

Latirus Pulleinei, *spec. nov.* Pl. i., fig. 1, 1*a*, 1*b*.

Shell elongately-fusiform, moderately thick. Whorls eight; nucleus absent from all the specimens (eight). Spire elongated, whorls regularly convex, with spiral liræ (on the penultimate six primary, and four smaller intermediate in the anterior part), acute, about one-third as wide as the interspaces, crossing over inconspicuous longitudinal rounded costellæ (15 on penultimate whorl), as wide as the intervals. Sublenticular longitudinal incremental striæ not crossing the liræ. Suture distinct, slightly marginate. Last whorl regularly convex, with about 22 acute spiral liræ, and eight interstitial striæ gradually becoming stouter anteriorly until they are as valid as the liræ; obsolete

longitudinal curved costellæ above the periphery, becoming gradually less conspicuous until they disappear, remaining longest close to the suture; near the aperture in a large example they reappear. Aperture obliquely-elongately-oval, descending into the canal, pinched into a tiny furrow posteriorly by the marginate suture. Outer lip simple, slightly sinuous, thin, finely crenated, obsoletely lirate internally. Columella subarcuate, sub-convex at the beginning of the canal; only a trace of callus, except anterior to the varix of the notch where it is subconcavely reflected, and forms a minute rimate umbilicus. The spiral liræ are almost quite obliterated at the inner lip, and three sub-raised thread-like plicæ are visible deeper in the throat, equal and equi-distant, and with the same obliquity as the spiral liræ, the highest at the centre of the aperture; sometimes a fourth exists close below them. Canal nearly as long as the aperture, sub-concave lengthwise along its left border, in the same sinistral oblique line as the aperture, wide, open, scarcely notched. Ornament, curved longitudinal rust-brown streaks on the summit of the costæ, sometimes broken into dots on the spiral liræ; at irregular distances on the body-whorl, and slightly sigmoid; crowded into a rusty area on the varix of the notch.

Total length, 51·5 mm.; greatest diameter, 19·5; length of aperture, 15·5; width, 6·5; length of canal, 11 mm. The relative lengths of the last whorl (including aperture and canal) and the spire vary slightly in individuals of the same size, and as the shell grows, the spire, which is at first shorter than the last whorl, becomes longer than it, as shown in the following series :—

Spire	7·75,	whorl 9·75,	as 79·5	to 100.
"	11·75,	" 14·25,	" 82·4	"
"	13·5,	" 16·,	" 84·4	"
"	19·,	" 22·25,	" 85·4	"
"	28·,	" 26·25,	"106·9	"

L. Walkeri of J. C. Melville, Proc. Malac. Soc. Lond., 1895, vol. I., No. 5, p. 221, pl. xiv., fig. 9, from Cossack, W. Australia, approaches it, but that shell is smaller, length 25 mm., more solid, costæ about half as numerous and more valid, suture not marginate, aperture with a distinct continuous inner lip, a thick everted or bevelled outer lip, and a more abrupt origin of the canal from the aperture. The above diagnosis is constructed from his plate and rather short description.

Habitat. — Eyre's Sand-patch, West Australia, many dead, *Mr. Pulleine* (after whom the shell is named), and *Verco;* Largs Bay, St. Vincent's Gulf *(D. J. Adcock);* subfossil, dredgings from Port Adelaide *(Dr. Perks).*

Crassatella producta, *sp. nov.* Pl. i., fig 2.

Shell compressed, solid, ovately-trapezoidal, equivalvular, inequilateral. Umbos conspicuous, acute, apposed, very slightly retroflected. Post-dorsal margin gently sloping, concave for one-fifth of its length next to the umbo, then almost straight; front dorsal margin scarcely convex, rapidly descending. Ventral margin nearly parallel with the post-dorsal, slightly approximating behind, uniformly subconvex, regularly rapidly curving upwards to form an almost circular anterior extremity; slightly ascending to join at a rounded angle the posterior margin. This is straightly truncated, nearly as long as the post-dorsal line in young specimens, about three-fourths in old ones, joining it at an obtuse angle of about 120°. Lunule long linear-lanceolate, smooth bevelled edges; right valve slightly including left; escutcheon, from the umbo almost the whole length of the post-dorsal margin, lanceolate, twice as wide as lunule, concave sides, sublenticular longitudinal striæ, left valve slightly overlapping the right. Well-marked post umbonal ridge to postero-ventral angle; surface flat behind it, subconvex elsewhere; markedly concentrically sulcated, seven ridges in the last five lines from the ventral margin, stout, acutely rounded, smooth (but for few microscopic incised lines, especially on their ventral sides), about equal in width to the interstices, which contain from one to three threadlets; straight behind the umbonal ridge and nearly parallel with the margin of the truncated posterior end, but with the angle at the ridge more open and rounded in the earlier ridges. Internally: right valve, triangular cartilage pit behind a single narrow triangular tooth, with a shallow triangular notch in it; lateral teeth, anteriorly a long linear furrow, the inner plate slightly triangularly projecting anteriorly, posteriorly the base of the escutcheon scarcely projecting and sharp; left valve, two cardinal teeth, diverging, anterior triangular stout and prominent with a long shallow triangular groove, posterior thin and lamellar; lateral teeth, anteriorly base of lunule slightly projecting and sharp, posteriorly a long linear furrow, inner plate slightly triangularly projecting at the posterior part. Ventral margin finely denticulated about half a line within the extreme edge, more minutely towards front lateral tooth, posterior truncated margin smooth. Ornament, light terra-cotta outside, deeper colored at the umbo, some specimens with many pink radiating lines of varying width from umbo to margin, and growing wider; some individuals pure white. Internally smooth, shining, white to deep flesh tint.

Dimensions, antero-post diameter, 10·25 mm.; umbo-ventral, 7·75; post-dorsal margin, 5·75; posterior, 3·5; depth of closed valves, 3·25.

Habitat.—Backstairs Passage, off Hog Bay, 16 to 18 fathoms, three valves; 20 fathoms, 17 valves; 22 fathoms, one alive, five valves; depth not noted, seven alive, 295 valves *(Verco.)*

Type specimens in my collection.

Crassatella micra, *sp. nov.* Pl. i., fig. 3.

Shell trigonally orbicular, rather compressed, equivalvular subequilateral, solid. Umbos acute, apposed, anteflected. Post-dorsal margin very short, at first convex, then almost straight, very rapidly descending; front dorsal margin minutely excavated close to the umbo, then rapidly descending, almost straight; the two margins form rather more than a right angle with each other. Ventral margin acute, uniformly convex, about a quadrant, ascending roundly into the posterior margin, and rather more narrowly into the anterior. Lunule rather large, elongate-ovate, somewhat indistinct, left valve slightly overlaps the right. Escutcheon linear-lanceolate, edges rounded, right valve includes the left. Surface flatly convex, deeply concentrically sulcated, seven ridges in the last three lines from the ventral margin, smooth, flatly-rounded, rather wider than the interstices, and not quite so high as wide. Internally, right valve, triangular cartilage pit behind a well-marked, triangular, cardinal tooth, in front of this is a short, vertical diverging tooth-like plate, in which ends the inner lamina of the anterior lateral tooth socket; anteriorly is a linear groove, most marked at its front end, where the inner lamina projects slightly; the post-dorsal margin lightly projects in a tooth-like lamina; left valve, triangular cartilage pit, behind two diverging cardinal teeth, the anterior of which is the more oblique, prominent and stout; base of lunule slightly prominent to form an anterior lateral laminar tooth; posteriorly a long linear groove, with barely visible projection of inner lamina beyond the level of the outer; inner margin not denticulated. Color light-horn tint, some specimens white with horn-tint about the umbo.

Dimensions, anterior-post diameter, 6 mm.; umbo-ventral, 5·5; depth of closed valves, 2·5 mm.

Habitat.—Backstairs Passage, St. Vincent Gulf, S.A.; dredged 20 fathoms, one alive; 22 fathoms, one alive; dredge siftings, depth not noted, probably about the same, six alive, 184 valves *(Verco)*. Type in my collection.

C. fulvida, Angas, from Port Jackson, is allied, but is a transversely oval shell, being more produced anteriorly, much thinner and with proportionally fewer and stouter concentric ridges.

EXPLANATION OF PLATES.

Plate I.

Fig.
1, 1a. Latirus Pulleinei, *Verco;* 1b. Details of sculpture.
2. Crassatella producta, *Verco.*
3. Crassatella micra, *Verco.*
4, 4a. Trophon Goldsteini, *Ten.-Woods.*
4b. Without its external coating, showing well-marked color bands.
5, 5a. Trophon angustus, *Verco.*

Plate II.

1, 1a, 1b. Latirus aurantiacus, *Verco.*
2, 2a. Murex Tatei, *Verco.*
2b. Details of sculpture.
3, 3a. Murex robustus, *Verco.*
4, 4a. Triton mimeticus, *Tate.*
5, 5a. Trophon levis, *Verco.*
6. Typhis Yatesi, *Crosse.*

Plate III.

1. Radula of Trophon Flindersi, *Ads.*, and *Any.*
2. Radula of Trophon Assisi, *Ten.-Woods.*
3. Radula of Trophon levis, *Verco.*
4. Radula of Fusus australis, *Quoy.*
5. Radula of Fusus pyrulatus, *Reeve.*
6. Radula of Fusus Dunkeri, *Jonas.*
7. Radula of Fusus Lincolnensis, *Crosse.*
8. Radula of Fasciolaria coronata, *Lam.*
9. Radula of Siphonalia dilatata, *Quoy.*

A Revision of the Recent Gasteropods of South Australia.

Part I.

By Jos. C. Verco, M.D., Lond., F.R.C.S., Eng., &c.

[Read May 7, 1895.]

It is proposed in the present paper to enumerate in order the species of the Families Muricidæ, Tritonidæ, and Fusidæ, as a contribution towards a complete catalogue of the recent gasteropods of the Province of South Australia. Several circumstances have of late favored such an effort. (1.) The issue by Mr. D. J. Adcock in 1893 of "A List of Species of Aquatic Mollusca of South Australia," which provided local collectors with as accurate a catalogue of our shells as was then available. It has proved of considerable value, by enabling each conchologist to discover roughly what species he possessed not included among our known fauna. (2.) The formation of the Malacological Section of the

Royal Society. At its monthly meetings the species named in the above list have been critically discussed seriatim with the aid of specimens from the cabinets of its several members, and my thanks are here heartily tendered to the Section for permission in this paper to use the material which has been so carefully collated by its Honorary Secretary, Mr. R. H. Pulleine. (3.) Dredgings in the deeper waters of St. Vincent and Spencer Gulfs, which have been undertaken during the last five or six years, have supplied many new and interesting forms, as well as living or recent specimens, in considerable numbers, of species previously described. (4.) The examination of the odontophore from several of these molluscs.

The following plan will be pursued, as far as the material and literature at our disposal will permit. The name of each species in our waters will be given with a reference to the work in which it was described, that name being chosen which has priority in point of time. Synonyms, with their references, will be enumerated. The places where it is found in South Australia will be given, with the depth in fathoms, when known. Any information beyond that contained in the original description will be added.

If readers notice any omissions or inaccuracies, and will intimate the same to the writer of this article, he will be pleased to acknowledge them with thanks, and will endeavor to incorporate them in subsequent communications to the Society's Proceedings.

FAMILY MURICIDÆ.

Genus Murex.

1. M. triformis, *Reeve.*

Reference.—Proc. Zool. Soc., 1845, p. 87. Conch. Icon. sp. 53.

Habitat.—Common throughout the whole coastline of South Australia. Also King George Sound, W.A., Victoria, and Tasmania, where, however, the specimens are much smaller. Most abundant, alive, in water from 5 to 10 fathoms, but it is found at all depths up to 22 fathoms *(J. C. Verco).*

2. M. Angasi, *Crosse.*

Reference.—*Typhis Angasi*, Jour. de Conch., 1863, vol. XI., p. 86, t. 1, fig. 2.

Type specimen from Port Jackson, N.S.W.

Syn.—*M. eos*, Hutton, New Zealand. Tryon Man. of Conch., vol. II., p. 88. *M. zonatus*, Ten.-Woods, Proc. Roy. Soc. Tasm., 1876, p. 132.

Habitat.—Encounter Bay, Spencer Gulf, St. Vincent Gulf, Investigator Straits.

Dredged alive, 13 fathoms, 1 ; 15 fathoms, 1 ; 17 fathoms, 2. Dead from 13 to 22 fathoms *(J. C. Verco)*, Tasmania.

3. M. umbilicatus, *Ten.-Woods. (Trophon umbilicatus).*

Ref.—Papers and Proceedings of the Royal Society of Tasmania, 1875-76, p. 135.

Syn.—*M. scalaris*, A. Adams (*non* Brocchi), Proc. Zool. Soc., 1853, p. 71.

Tryon in his Man. vol. II., p. 155, has placed it in *Urosalpinx*, which he defines as having a purpuroid operculum. But this species has a muricoid operculum, and belongs to the genus *Murex*. It was formerly confounded with *M. octogonus*, Quoy, Voy. de L'Astrol., 531, t. 36, figs. 8, 9.

Type specimen from the E. coast of Tasmania, uncommon.

Hab.—Spencer Gulf, St. Vincent Gulf, Backstairs Passage, Encounter Bay.

Dredged alive, 8 fathoms, 1 ; 12 fathoms, 2 ; 13 fathoms, 1 ; 14 fathoms, 2 ; 17 fathoms, 1 ; 19 fathoms, 2 *(J. C. Verco)*.

4. M. Brazieri, *Angas.*

Ref.—Proc. Zool. Soc., 1877, p. 171, pl. 26.

This was formerly confounded with *M. polypleurus*, Brazier.

According to Angas, it is somewhat allied to *M. mundus*, Reeve ; and according to Brazier, in Proc. Linn. Soc., N.S.W., vol. VIII., pt. I., *Trophon tumidus*, Petterd, is a synonym.

Hab.—Spencer and St. Vincent Gulfs, Investigator Straits, and Backstairs Passage *(J. C. Verco)*, Encounter Bay *(D. J. Adcock)*.

Type specimen, Port Jackson Heads, 20 fathoms. Dredged alive, 17 fathoms, 1. Dead at 17, 19, and 22 fathoms, several. Many alive and dead in deep-water dredge-siftings *(J. C. Verco)*.

5. M. serotinus, *A. Adams.*

Ref.—Proc. Zool. Soc., 1851, p. 268.

Syn.—*M. Blainvillei*, Payr., a Mediterranean form, according to Sowerby.

Hab.—One specimen, obtained alive, amongst the rocks at low water, spring tides, Aldinga Bay *(Angas)*.

No other collectors have taken it in Australia.

6. M. polypleurus, *Brazier.*

Ref.—Proc. Linn. Soc., N.S.W., vol. VIII., 1894, part II., p. 179.

This was formerly known here as *M. pumilus* of A. Adams, but proves to be quite a distinct shell. Brazier refers it to the subgenus Pseudo-Murex, Monteserato, 1872.

Hab.—Several alive and dead in deep water in Spencer and St. Vincent Gulfs, depth not measured *(J. C. Verco)*.

7. M. Tatei, *Verco.*

Ref.—*Antea*, p. 84.

Hab.—Backstairs Passage, S.A. Dredged alive in deep water *(J. C. Verco).*

8. M. robustus, *Verco.*

Ref.—*Antea*, p. 85.

Hab.—Investigators Straits; deep water, several alive and dead *(J. C. Verco).*

Genus Typhis.

T. Yatesi, *Crosse.*

Ref.—Jour. de Conch. XIII., 1865, p. 54, pl. ii., fig. 3.

Type specimen, St. Vincent Gulf, S.A.

Hab.—Backstairs Passage, Spencer and St. Vincent Gulfs.

Dredged 15 fathoms, 1 alive; 17 fathoms, 1 alive; 22 fathoms, 1 dead. Several alive and dead in deep water *(J. C. Verco).* Pl. ii., fig. 6.

In living specimens which measure 12 mm. from the end of the spire to the end of the varix anteriorly whence the anterior tube springs, this is 6 mm. in length, and the posterior tube 9 mm. I have an individual which, including the whole length of the shell and anterior tube, would total 25 mm. Crosse's specimen was 14 mm. total length.

Genus Trophon.

1. T. Goldsteini, *Ten.-Woods.*

Ref.—Proc. Roy. Soc., Tasmania, 1875, p. 136.

Type, Long Bay, Tasmania.

Several South Australian specimens compared with individuals from Tasmania, kindly lent by Miss Lodder, prove to be identical. Some, however, almost constitute a variety, being smaller, and with far less prominent spiral liræ. The shell in life is composed of two distinct layers, an inner enamel-like foundation and an outer sordid white, loose textured, soft chalk-like coating. In perfect specimens this is smooth, but when very slightly worn it shows numerous spiral and longitudinal fibres or incisions. In beach-rolled specimens this is nearly or entirely removed, leaving only the hard shining enamel-like basis, which shows numerous spiral threadlets besides the few sub-raised spiral liræ.

Hab.—Middleton and Rivoli Bay *(D. J. Adcock)*, Streaky Bay, Pondolowie Bay *(J. C. Verco).* Dredged Spencer Gulf, 9 fathoms, 1; depth probably 15 fathoms, 4 alive, 1 dead; 10 fathoms, 1 dead; Backstairs Passage, 22 fathoms, 1 dead; Investigators Straits, 20 fathoms, 1 dead (*J. C. Verco*).

2. T. angustus, *Verco.*

Ref.—*Antea*, p. 86.

Hab.—St. Vincent Gulf; dredged deep water, 2 alive, 1 dead (*J. C. Verco*).

3. T. Paivæ, *Crosse.*

Ref.—Jour. de Conch., Third Series, vol., XII., 1864, p. 278, pl. xi., fig. 7.

Type specimen collected at low tide under stones on Yorke's Peninsula, S.A.

Tryon classes it as a *Urosalpinx*, and regards *Fusus Hanleyi*, Angas, as an elate form (Man. of Conch., vol. II., p. 155). But it is not a *Urosalpinx*, and *Fusus Hanleyi*, Angas, is a different shell altogether. He says also "it is not readily distinguished from *U. Floridana*, Conrad. Von Martens considers *Fusus corticatus*, Hutton, a synonym of *U. Paivæ*," *loc. cit.*

Hab.—Dredged alive and dead, deep water St. Vincent Gulf (*J. C. Verco*), Encounter Bay (*D. J. Adcock*).

4. T. recurvus, *Koch* (Fusus).

Ref.—Abbild. und Beschreib., Conch. Philippi, vol. II., p. 119, tab. 3, fig. 6.

This shell was separated as a species distinct from *T. Paivæ*, by Mr. W. T. Bednall, who was proposing to describe it as new, when its identity with the *Fusus recurvus* of Koch, of unknown habitat, was recognised.

Hab.—St. Vincent Gulf, Salt Creek (*W. T. Bednall*), Semaphore, alive (*D. J. Adcock*).

5. T. Assisi, *Ten.-Woods.*

Ref.—Proc. Roy. Soc. Tasmania, 1876, p. 132.

Type specimens, N. Coast, Tasmania (*W. F. Petterd*).

Tryon classes it as a *Urosalpinx*, and "doubts its distinctness from *U. Paivæ*, Crosse. It is probably a young shell," Man. of Conch., vol. II., p. 155.

But it is not a *Urosalpinx*, for its operculum is ovate, with an apical nucleus. It is quite distinct from *T. Paivæ;* as T. Woods says, "it is easily distinguished by its long canal, and peculiar lamellose striations" (longitudinal, *J. C. V.*).

It is not a young shell. Counting the number of its whorls, it is often older than *T. Paivæ*, and when full grown retains the same characters.

It has been placed in Mr. Adcock's list as a *Peristernia;* but the absence of columellar plications, and the muricoid, and not fasciolarioid radula, which is figured on pl. iii., fig. 2, remove it from that genus.

Dredged. Yankalilla Bay, St. Vincent Gulf, 15 fathoms, in ooze, 2 alive, 8 dead; Spencer Gulf, 13 fathoms, 2 dead; 15 fathoms, 2 dead; Investigators Straits, 15 fathoms, 3 alive, 3 dead; 17 fathoms, 9 alive, 68 dead (*J. C. Verco*).

6. T. Petterdi, *Brazier.*

Ref.—Jour. Conchyl., third series, vol. X., 1870, p. 303, and vol. XI., 1871, p. 324, t. 12, fig. 2.

Syn.—*T. clathratus*, Woods, according to Von. Martens (Zool. Rec., 152, 1875).

Murex scalarinus, A. Adams, is identical or allied, according to Tryon.

Hab.—Middleton Beach, very many *(D. J. Adcock).* Aldinga Beach (*J. C. Verco*). Dredged Spencer Gulf, deep water, many alive and dead (*J. C. Verco*). The Levens Beach, under stones, Tasmania (*Miss Lodder*).

My dredged specimens are identical with some forwarded by Miss M. Lodder from Tasmania. Mr. Adcock's, from Middleton, appear to be the same species, but have a blunter apex, and a shorter snout, probably because beach-worn; they are also slightly larger and stouter, perhaps because from a more exposed locality, and more manifest color bands. These bands are evidently variable in number; some have three, one just below the suture, a second in the centre of the last whorl, a third below the periphery, and winding round the base. Some have only the lower two, others only the lowest, and some are destitute of bands.

7. T. Brazieri, *Ten.-Woods.*

Ref.—Proc. Roy. Soc. Tasmania, 1875, p. 136.

Type specimen, Tasmania.

Hab.—MacDonnell Bay *(D. J. Adcock);* Victoria.

8. T. Flindersi, *Ads. & Ang. (Purpura).*

Ref.—Proc. Zool. Soc., 1863, p. 421.

Type from Yorke Peninsula, S.A.

The operculum is distinctly muricoid, and not purpuroid; and Tryon is right in transferring it to *Trophon* from *Purpura.* Woods suggests that *T. Flindersi*, *T. littorinoides* (Ten.-Woods), and *T. propinqua* (Ten.-Woods) may prove varieties only of the same species. The Malacological Section of the Roy. Soc. of S.A. are of opinion that the latter two are synonymous with *Ricinula Adelaidensis;* but *T. Flindersi*, is a distinct species.

Hab.—Along the whole coast of South Australia, on rocks from high to low tides

Dentition, plate iii., fig. 1.

9. T. levis, *Verco.*

Ref.—*Antea*, p. 87.

Hab.—Backstairs Passage, St. Vincent Gulf, South Australia, 22 fathoms, dredged alive, one example (*J. C. Verco*).

Genus Purpura.

1. P. succincta, *Martyn.*

Ref.—Univ. Conch., II., pl. 45.

Tryon gives South Australia as the metropolis of this species (Man. of Conch., vol. II., p. 170), but the form figured by Martyn, having strong revolving ribs with excavated sides, is very rare on the South Australian coast. It would appear, however, that *P. textiliosa*, Lam. (Edit. Desh. 2, vol. X., p. 77), is only a variety of *P. succincta*, and this is a very common shell here. Tryon also affirms the identity of *P. ægrota*, Reeve (Conch. Icon. 1846, sp. 42), with *P. mancinella*, Linn. (Syst. Nat. Edit. 12, 1,219), both of which are tuberculate forms. From a large number of specimens we have been able to obtain complete series of gradations between *P. succincta* and *P. textiliosa*, and between *P. textiliosa* and *P. ægrota*, proving them all to be but variations of a common species. As *P. succincta*, Martyn, has priority of description, this is chosen as the name of the species, and the rest are regarded as varieties. This is satisfactory, too, inasmuch as a form closely resembling the typical shell is the first to appear palæontologically in our Miocene strata (*teste*, *Tate*).

2. P. striata, *Martyn* (Buccinum striatum).

Ref.—Univ. Conch., t. 7 ; is also given by Tryon as a synonym for *P. succincta.*

It is unknown to local collectors, but included here on the authority of Brazier (P.L.S., N.S.W., vol. V., p. 481, 1881).

3. P. Baileyana. *Ten.-Woods.*

Ref.—Proc. Roy. Soc., Victoria, 1880, p. 80.

Very rare in South Australia.

Hab.—Living on rocks, Guichen Bay (*Zietz*).

Genus Ricinula.

1. R. Adelaidensis, *Crosse.*

Ref.—Jour. de Conch., 1865, vol. XIII., p. 50, t. 2, fig. 1.

Specimens of type and two varieties, *R. procerula* and *R. aurea*, from Port Adelaide and Gulf St. Vincent.

The Malacological Section are of opinion that *Trophon littorinoides*, Ten.-Woods (Proc. Roy. Soc., Tasmania, 1875, p. 135), and *Trophon propinqua*, Ten.-Woods (Proc. Roy. Soc.,

Tasmania, 1876, p. 136), are identical, as suggested by Woods himself, and are synonyms of *R. Adelaidensis;* but quite distinct from *Trophon Flindersi*, of which Woods thought they might be varieties.

Hab.—Streaky Bay to Encounter Bay, on rocks below high-tide mark.

2. R. reticulata, *Quoy and Gaimard.*

Ref.—Voy. de l'Ast, II., 566, t. 38, fig. 17, 18.

Syn.—*Purpura humilis*, Crosse and Fischer (Jour. de Conch., XIII., 1865, p. 51, t. 2, fig. 2); the type from St. Vincent Gulf.

Tryon regards these as young shells of the beaded form of *R. undata*, Chem. (Man. of Conch., vol. II., p. 189). This we are unable to determine.

Dimensions.—Crosse gives the dimensions as 12 mm. by 6 mm., but it often attains the magnitude of 18 mm. by 10 mm. Its station is quite different from that of *R. Adelaidensis*, which is a littoral shell; for it is dredged alive at 13 fathoms, 1; at 18 fathoms, 3; while larger specimens have been taken dead at 15 and 20 fathoms.

Hab.—Streaky Bay to Encounter Bay. Tasmania.

Genus Adamsia.

A. Adelaidæ, *Adams and Angas.*

Ref.—Proc. Zool. Soc., 1863, p. 421, t. 37, fig. 2.

Type from Port Adelaide, S.A.

Tryon, in Man. of Conch., vol. II., p. 156, gives it as a variety of *Urosalpinx tritoniformis*, Blainville, which he says is identical with *Adamsia typica* of H. and A. Adams, and that *Purpura neglecta* of Adams and Angas is synonymous with *A. Adelaidæ*. Specimens of the first from N.W. Tasmania (*W. T. Bednall*) are, however, easily separable by their more elate form and much more numerous spiral liræ and scarcely visible incremental striæ. *P. neglecta* from Port Jackson (*W. T. Bednall*) is also distinguishable as a smaller shell, more elate, and angulate and tuberculo-plicate, and has a closer affinity with *Ricinula reticulata*, Q. and G.

FAMILY TRITONIDÆ.

Genus Triton.

1. T. nodiferus, *Lam.*

Ref.—Edit. Desh., IX., 624.

Syn.—*T. Saulieæ*, Reeve, Proc. Zool. Soc., 1844, 112; Conch. Icon., 1844, fig. 17; and *T. australis*, Lam., Edit. Desh., IX., 625 (see Tryon Man., vol. III., p. 10).

One specimen in Adelaide Museum, found on Thistle Island, Spencer Gulf, by Mr. Zietz.

2. T. subdistortus, *Lam.*

Ref.—Edit. Desh., IX., 638.

Hab.—St. Vincent and Spencer Gulfs; Encounter and Lacepede Bays (*D. J. Adcock*); Tasmania; Victoria.

Dredged alive, 10 fathoms, 4; 11 fathoms, 2; 12 fathoms, 1; 15 fathoms, 1, with many round yellow eggs attached separately to inside of deep valve of Pecten fumatus; 17 fathoms, 5; 22 fathoms, 1 (*J. C. Verco*).

3. T. Bassi, *Angas.*

Ref.—Zool. Proc., 1869, 45, t. 21, fig. 2.

Syn.—*T. fraterculus*, Dunker (Mal. Blatt., XVIII., 1871, 106).

Tryon, in his Man., vol. III., p. 11, says it is probably synonymous with *T. subdistortus*, but he could not have had the two shells for comparison; they are quite distinct.

Type from Corner Inlet, Bass Straits (*Brazier*).

Hab.—St. Vincent Gulf, Backstairs Passage, Investigators Straits (*J. C. Verco*), Encounter and Lacepede Bays (*D. J. Adcock*).

Dredged alive, 14 fathoms, 1 mature and 6 minute fry inside the valve of a Cardium multicostatum; 17 fathoms, 4 and 1 immature; 19 fathoms, 1 in dead shell and coral (*J. C. Verco*).

4. T. mimeticus, *Tate (Sipho?).*

Ref.—Trans. Roy. Soc. S.A., 1893, part I., p. 189, pl. i., fig. 10; also *Verco, ante*, p. 88, pl. ii., figs. 4, 4*a*.

Tapley's Shoal, 12-16 fathoms, 1 dead (*Matthews*); Investigator's Straits, 15 fathoms, 1 dead; 20 fathoms, 1 dead (*Verco*).

5. T. Spengleri, *Lam.*

Ref.—Edit. Desh., IX., p. 627.

Hab.—Middleton (*D. J. Adcock*), Port Lincoln (*Perks*), Cable Cove, Cape Spencer (*J. Matthews*).

6. T. Waterhousei, *Adams & Angas.*

Ref.—Zool. Proc., 1864, p. 35.

Type from Port Lincoln.

Hab.—From Streaky Bay to Encounter Bay (*Verco*), Port Jackson.

Dredged alive, 14 fathoms, 1; 16 fathoms, 1; 20 fathoms, 2; 22 fathoms, 1 (*Verco*).

7. T. Barthelemyi, *Bernardi.*

Ref.—Jour. de Conch., 1857, p. 55. *Angas*, Proc. Zool. Soc., 1865, p. 161.

" Evidently very closely allied to *T. Spengleri*, of which it will very probably prove to be an overgrown form" (Tryon Man., vol. III., p. 17).

This shell has not been taken or recognised by local collectors.

Angas, *loc. cit.*, gives its station " amongst rocks at low tides.

"*Hab.*—Cape Northumberland ; Gippsland, Victoria."

He distinguishes it from *T. Spengleri*.

8. T. exaratus, *Reeve.*

Ref.—Proc. Zool. Soc., 1844, p. 116 ; Conch. Icon., 1844, fig. 50.

Tryon (Man., vol. III., p. 23) suspects this to be identical with *T. gibbosus*, Brod.

Type from N. coast of Australia.

Hab.—Middleton and Kingston Beaches (*Adcock*).

9. T. Quoyi, *Reeve.*

Ref.—Conch. Icon., 1844, fig. 93.

Syn.—" *T. viperinum* of Kiener, not Lamark—the latter being a distinct fossil form" (Tryon, Man., vol. III., p. 24).

Hab.—Along whole coast-line of South Australia. Tasmania ; Victoria.

Dredged alive at all depths from 5 to 30 fathoms, many (*Verco*).

10. T. verrucosus, *Reeve.*

Ref.—Proc. Zool. Soc., 1844, p. 118 ; Conch. Icon., 1844, fig. 71.

Hab.—Streaky Bay, Spencer Gulf (*Verco*), Aldinga and McDonnell Bay (*D. J. Adcock*).

11. T. eburneus, *Reeve.*

Ref.—Proc. Zool. Soc., 1844, p. 118 ; Conch. Icon., 1844, fig. 69.

Type from Isle of Ticao, Philippines.

Hab.—Wallaroo Bay (*Maughan*), Corny Point, Spencer Gulf (*Perks*), Pondolowie and McDonnell Bays (*Verco*). Dredged one recent in 22 fathoms, Backstairs Passage (*Verco*).

12. Triton (Epidromus) Bednalli, *Brazier.*

Ref.—Proc. Linn. Soc. of N.S.W., 1875, p. 6.

Type from Guichen Bay, S.A. (*Bednall*).

It may be dark mahogany-brown, or quite white, or with narrow brown bands, or with two rows of small square spots on each spire-whorl, and four on the body-whorl.

Hab.—Corny Point, Spencer Gulf, very fine (*Perks*); Middleton (*D. J. Adcock*), Victoria ; St. Vincent and Spencer Gulfs, dredged 16, 20, and 22 fathoms, 1 dead (*Verco*).

Genus Ranella.

1. R. leucostoma, *Lamarck.*

Ref.—Edit. Desh., vol. IX., p. 542; Reeve, Conch. Icon., fig. 4; Coq. Viv. Mon., p. 29, pl. ix., fig. 1.

Hab.—Middleton (*D. J. Adcock*), Yorke Peninsula, St. Vincent Gulf (*Matthews*); Tasmania; New Zealand.

2. R. argus, *Gmelin.*

Ref.—Dieff., N.Z., p. 229; Reeve, Conch. Icon., fig. 13; Chenu, fig. 713.

Syn.—*R. ranelliformis*, King, Zool. Jour., vol. V., p. 347; *R. vexillum*, Sow., Zool. Proc., 1841, p. 51; *R. proditor*, Frauenfeld, Verh. Zool. Bot. Gesell, Wien, XV., 1865, 894; Velain, Archives Zool. Exp., VI., 100, t. 2, fig. 5; *R. tumida*, Dunker, Zool. Proc., 1862, 239.

Type form from Cape of Good Hope.

Ref.—One small example cast up Port Elliot (*Miss E. Stow*); New Zealand.

Genus Fusus.

1. F. australis, *Quoy.*

Ref.—Voy. de l'Ast., vol. II., p. 495, t. 24, figs. 9-14 (pl. xxxiv., according to Kiener in Coq. Viv. Mon. p. 25, pl. xii., fig. 1).

Syn.—*F. crebriliratus*, Rve., Conch. Icon., 1847, fig. 20; *F. marmoratus*, Phil., Abbild. & Besch., 1846, vol. II., p. 120, t. iii., fig. 7; *F. rudicostatus*, Sby., Thes. Conch., 1880, sp. 30, fig. 19; *F. lævigatus*, Sby., Thes. Conch., 1880, sp. 30, fig. 157; *F. nodocinctus*, A. Ads., Zool. Proc., 1855, p. 222; *F. aureus*, Rve., Conch. Icon., 1847, fig. 17; *F. caudatus*, Quoy, Voy. de l'Ast., vol. II., p. 503, t. 34, fig. 20, 21.

Its dentition is figured by me on pl. iii., fig. 4, and shows a small rachidian tooth, with three short denticles, and a long, curved, ten-tooth lateral.

Hab—Spencer and St. Vincent Gulfs, Encounter Bay.

Dredged alive at all depths up to 23 fathoms (*Verco*).

2. F. pyrulatus, *Reeve.*

Ref.—Conch. Icon., 1847, t. 13, fig. 50*a*-50*b*.

"The type is from Tasmania, but it also occurs in Port Phillip Bay, and, according to Angas, in Spencer Gulf" (Tate, Trans. Roy. Soc. S.A., vol. XIV., p. 257).

Dredged alive in Hardwicke Bay, Spencer Gulf, many; Backstairs Passage, 15 fathoms, 1 small; 17 fathoms, 1 small. Investigator's Straits, 15 fathoms, 1 recent (*Verco*).

This shell, originally described by Reeve as a *Fusus*, and so

placed by Tryon (Man., vol. III., p. 60)—he had not seen the species—was named by Prof. Tate, *loc. cit.*, *Austrofusus pyrulatus*. A drawing of its dentition, given on pl. iii., fig. 5, shows a three-denticled rachidian and curved, saw-like laterals, and definitely withdraws it from *Siphonalia*, and makes it congeneric with *Fusus australis*.

3. F. ustulatus, *Reeve.*

Ref.—Conch. Icon., 1848, fig. 66.

This species was also classed by Prof. Tate, *loc. cit.*, as *Austrofusus;* but Tryon regards it as a *Fusus*. Although I have not yet been able to determine its dentition, yet from its conchological characters, there is little doubt it will prove to be a *Fusus*. Tate also makes it a synonym of *F. sulcatus*, Lam. (An. s, Vert., 1822, vol. VII., p. 125). Tryon, on the other hand, gives *F. sulcatus* of Lam., as a *Siphonalia*, and *F. ustulatus* of Reeve as a *Fusus*. There is little question they are distinct species. Although Tryon gives South Australia as the habitat of *F. sulcatus*, Lam., yet Kiener, in Coq. Viv., when describing and figuring the species from the Lamarckian Collection, says the locality is unknown. I am not aware on what authority Tryon gives South Australia. The excellent plate in Coq. Viv., p. 26, pl. xiii., fig. 1, is that of quite a different shell from our *F. ustulatus*. The former is thin, very ventricose, and has marked, slightly wavy, transverse, dark-chocolate-brown spiral lines; whereas the latter is solid, by no means ventricose, much more attenuated in the spire, and ornamented only with a little scorching on the longitudinal costæ. Chenu's figure of *F. sulcatus* (Manuel de Conchyliologie, p. 140) is evidently not drawn from Lamarck's shell, and is as evidently *F. ustulatus;* here is the explanation of Tate's synonymy.

Hab.—No locality was known to Reeve, but Angas recorded it from St. Vincent Gulf. I have it from three widely separated beaches in this Gulf, and dredged in life, but small, at 19-24 fathoms. Encounter and Lacepede Bays (*D. J. Adcock*).

4. F. Dunkeri, *Jonas.*

Ref.—Malak. Beitrag, 1844, p. 129; Abbild, &c., Phil., 1844, vol. II., p. 191, *t.* 4, fig. 4.

Tryon says (Man. of Conch., vol. III., p. 60) "this is evidently a very much worn specimen, and perhaps not adult; the locality also has not been confirmed by subsequent collectors," *i.e.*, the western coast of New Holland. I have a specimen from Eyre's Sand Patch, which is on the southern coast of Western Australia. He further remarks, "Dr. Philippi considered *F. Taylorianus*, Rve., a synonym, but I do not think the condition of *F. Dunkeri* justifies a positive conclusion. If the two species be merged, the

adopted name will be *Dunkeri*, which has decided priority of publication." Also "*F. Taylorianus*, Rve., appears to be a worn immature state of *F. cinereus*, Rve.," *loc. cit.* The worn state of Jonas's specimen is not so evident to me. It is certainly the same shell as *Siphonalia fuscozonata*, Angas (Proc. Zool. Soc., 1865, p. 56), which from Jonas's priority of definition becomes a synonym. It is not a *Siphonalia*, but a *Fusus*, as is plain from its dentition given in pl. iii., fig. 6. In Mr. Adcock's list it is classed as a *Peristernia*, but it has no trace of columellar folds.

Hab.—St. Vincent and Spencer Gulfs, Encounter Bay.

Dredged alive at all depths from 9 to 22 fathoms (*Verco*).

5. F. Lincolnensis, *Crosse.*

Ref.—Jour. de Conch., XIII., 53, t. 2, fig. 4, 1865.

Type from Port Lincoln, S.A.

Tryon says (Man. of Conch., vol. III., p. 66), "The coloration and very short canal remove this species from *Fusus*, yet I do not know where to locate it. Resembles a *Muricidea*." Its dentition I have shown on pl. iii., fig. 7. There is a rachidian tooth with three small cusps, and long curved saw-like laterals. The prongs of these are very variable in size, not only on any particular lateral, but even corresponding prongs on any pair of laterals, or on consecutive laterals. The radula disposes at once of any suggestion to place it among the *Muricidæ* as a *Muricidea* or *Ocinebra*, and classes it with the *Fusidæ;* while the absence of columellar folds decides its position in the genus *Fusus*. However, unlike ordinary species of the genus, it is left there by a process of exclusion.

Hab.—Spencer Gulf, St. Vincent Gulf, Encounter Bay.

Dredged alive, 10 fathoms, 1; 16 fathoms, 1; 20 fathoms, 1; 22 fathoms, 1; and dead at all depths from 9 to 22 fathoms, many (*Verco*). Under stones at low water, Port Lincoln (*Tate*).

Fusus Novæ Hollandiæ, Rve., and *Fusus Hanleyi*, Angas have not been collected in South Australian waters.

Genus Fasciolaria.

1. F. fusiformis, *Valenciennes.*

Ref.—Kiener, Coq. Viv. Mon., p. 13, t. 4, fig. 2.

The habitat is given there as "The shores of New Holland," with the added note, "A species which still appears rare in collections. We do not know the locality. The Museum (*i.e.*, the Paris Natural History Museum) has two individuals." The shell which has hitherto been considered as *F. fusiformis* among local collectors is only a comparatively smooth variety of *F. coronata*. The true species is rare here, and is represented by

a specimen obtained by Mr. Adcock from Macdonnell Bay, and by two received by me from the same locality. It is a much smaller shell, 2 inches 3 lines, narrower, more regularly and abundantly spirally sulcated, and with well-marked numerous spiral liræ in the throat. Tryon doubts whether it is more than an extreme form of *F. filamentosa*, Lam. (Man., vol. III., p. 76).

2. F. coronata, *Lam.*

Ref.—Edit. 2, vol. IX., 435 ; Reeve, Mon., t. 6.

Type specimens from King and Kangaroo Islands.

Figured and described in Coq. Viv., p. 9, pl. ix., fig. 1, "A species rather common."

This is one of the most common of our Gasteropods, and one of the most variable. Some large specimens may be markedly angulated and coronated throughout all their whorls. Others may lose both angles and tubercles as early as the fourth whorl. These constitute the variety which has usually been regarded as *F. fusiformis*, but in all other respects they correspond with *F. coronata*. Others, after continuing in this form for one or two whorls, again assume the typical shape, and so demonstrate the freedom from angle and tubercles to be only a partial, and not even an individual variation.

Hab.—Throughout whole South Australian coast-line, at low tides attached to rocks.

Dredged alive, not common, up to 22 fathoms (*Verco*). Radula, pl. iii., fig. 8.

Genus Latirus.

1. L. aurantiacus, *Verco.*

Ref.—*Antea*, p. 79.

Unique. Dredged alive, Backstairs Passage, 18½ fathoms (*Verco*).

2. L. Pulleinei, *Verco.*

Ref.—*Antea*, p. 80.

Type from Eyre's Sand Patch, W. Australia.

Hab.—Largs Bay, St. Vincent Gulf (*D. J. Adcock*) ; sub-fossil in dredged silt, Port Adelaide (*Perks*).

Genus Latirofusus.

1. L. nigrofuscus, *Tate.*

Ref.—Proc. Roy. Soc. S.A., vol. XIV., part II., p. 258, pl. xi., fig. 3.

Dredged alive, St. Vincent Gulf, 3-4 fathoms (*Matthews*) ; ? depth (*Verco*) ; Spencer Gulf, 13 fathoms, 1 (*Verco*) ; shell sand, Aldinga Bay (*Kimber*) ; Encounter Bay (*Adcock*).

Correlation of the Marine Tertiaries of Australia.

By Professor R. Tate and J. Dennant, F.G.S., Corr. Memb.

PART II., VICTORIA *(continued)*.

Special Notes on the Eocene Beds at Cape Otway and River Aire, with General Remarks.

[Read June 4, 1895.]

Introduction.

In 1864 the coast-line in the neighbourhood of Cape Otway was surveyed and reported upon by Messrs. Wilkinson and Daintree, of the Geological Survey of Victoria. Collections of fossils were made by them, but with the exception of the corals, have been apparently laid aside and forgotten. Their report is out of print, and for the preservation of portions of its contents, as well as for the drawings of coast sections accompanying it, we are indebted to Professor M. Duncan, who made copious extracts from it when describing the corals in the Geological Society's Journal.* A second survey of the coast was made by Mr. Krause in 1873,† but as he was principally engaged in searching for outcrops of coal, the conclusions of his predecessors concerning the geological details of the coast-line seem to have been accepted. An elaborate plan of the coast was issued by the Mining Department as the result of this survey, giving topographical as well as geological information.‡ Notwithstanding some errors in the Aire River portion of the district, we found the sheets useful as a topographical guide, but, as we shall show in the sequel, grave blunders appear in the mapping of the tertiary outcrops from the Aire River to Castle Cove. We do not allude to the mistake almost universal with the earlier geologists of Victoria in regarding undoubted Eocene strata as Miocene. This may be expected, and the necessary correction is now almost unconsciously supplied, but in the case before us an area some miles in extent is colored Miocene (Eocene) on the map where certainly the prevailing, if not the only outcropping, rocks are the ordinary Post-Pliocene, or recent dune limestones, so common on our coasts. As is well known, they are æolian rocks. In the original

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* Q. J. G. S., vol. XXVI., 1870.
† Progress Report Geol. Sur. of Victoria, No. 1, 1874.
‡ Geol. Sketch Map of the Cape Otway District, Krausé, 1874.

Memoir by Mr. Wilkinson (as quoted by Duncan) the reference to these rocks is not very clear, though some portions at least seem to have been recognised as younger than Miocene, and are called "more recent Tertiary sandstone." So far as the section given affords a clue, the dune limestone, with its characteristic variation of dip, is apparently indicated. We shall notice this section at greater length presently in the special description of the Aire River rocks.

Cape Otway is 39 miles from Forrest, the nearest railway station, and only 14 miles from Krambruk (Apollo Bay), the terminus of a coach-line; but, though in reality not more than a day's journey from Melbourne, the nature of the country renders travelling difficult, and it is seldom visited, except by a few adventurous tourists. At the Aire River, five miles west of Cape Otway, our guide assured us that probably no one had been on the beach for three years prior to our visit. From Krambruk travelling is either on foot or on horseback, and if a stay at the Cape is intended it is necessary to take materials for camping, the proverbial hospitality of Western Victoria being there conspicuous by its absence. At the Aire River we were most hospitably entertained by Mr. Robinson, the genial proprietor of the Aire Cattle Station.

Cape Otway.

Although called by the above name, the section is really about one and a half miles west of the Cape and close to Point Flinders. The fossils occur in great abundance on the surface of mound-like masses of slate-colored stiff clay which extend from sea-level up to a height of about 40 feet. The chief shells are species of Turritella and Pleurotoma, the latter being especially characteristic of the bed. As the list appended shows, numerous other species occur, but relatively to those named they are individually scarce, many species in our collections being represented by one or two examples only. It is useless to dig for fossils, as just below the surface the clay appears quite barren, though of course the shells are there, but undistinguishable until the clay is washed away from them. The fossiliferous patch is very limited in extent, but as the tops of isolated mounds crop out from under the sand for a few chains to the west, it is probable that the clay underlies for a considerable distance.

To the east mesozoic rocks rise on the cliffs, and the fossiliferous clay disappears. Resting upon the tertiaries, or, when they are wanting, directly upon the mesozoic strata, is a layer of dune limestone of variable thickness, and again upon this the ordinary sand dunes of the coast.

At Point Flinders itself small streams of clear sparkling water fall over the face of the rock. Their origin is interesting, as

at the general level of the country on the top of the cliff there is no sign of a stream. The water, in fact, issues just under the dune limestone, which is a porous rock, and then flows over the dense secondary strata. It flows freely all the year round, and is probably derived from some of the inland water courses, which are numerous enough in the forest country a short distance from the coast. Even the clay of the tertiary mounds is traversed by small runlets of water having the same origin. It was an unusual luxury for us as fossil collectors in the hottest time of the year to have an abundant supply of cold water close at hand. Were it more accessible, this pretty spot would no doubt prove very tempting, being the very model of a picnic resort, especially to those of a geological turn of mind.

In addition to the fossils gathered personally this and last year, we have had access, through the kindness of Mr. Crouch, to a collection made by him while residing at Cape Otway.

The total of determinable species of Mollusca recorded in the appended list is 123; of these 38, or 30 per centum, are, as far as known, restricted to the locality; whilst the occurrence of three species of *Borsonia*, having the whole aspect of *Surcula*, two of which are among the commonest species present, impart a local peculiarity. Moreover, two genera, *Atlanta* and *Woodia*, are added to our Eocene fauna, and are therefore peculiar to the Cape Otway section. The Aldinga, Spring Creek, and Muddy Creek faunas are represented respectively by 40, 41, and 44 species. The most noteworthy fact is the comparatively large proportion of Aldingian species which have hitherto been largely unrecognised among the species of the other chief fossiliferous sections in Australia. Thus of the 40 Aldinga-species present at Cape Otway 18 are restricted to these two sets of beds (in this connection one coral may be added), whilst five of the species indicated are common also to the Spring Creek fauna.

The Aldinga-facies is further intensified by the occurrence of *Plesiotriton*, *Conorbis*, *Mesalia*, and *Triploca*, hitherto restricted. The two former genera are represented by distinct species, and the two latter each by a species in common.

By contrast the number of species in common with the neighbouring section at Gellibrand is 30, which are extralimital. Hence the most reasonable explanation to reconcile these discordant facts of distribution is that the Gellibrand and Cape Otway sections belong to distinct horizons. But before this important question can be adequately discussed a review of the Aldinga beds and those at Table Cape in Tasmania is essential, and for the present we are reluctantly compelled to postpone it.

LIST OF CAPE OTWAY FOSSILS.

[Index numbers to localities:—1, Aldinga; 2, Spring Creek; 3, Gellibrand; 4, Muddy Creek; 5, Mornington; 6, Table Cape].

GASTROPODA.

Murex (Pteronotus) calvus, *Tate*	1	.	.	.	.	.	.	
" " bifrons, *Tate*	1	.	.	.	.	.	.	
" (Chicoreus) tessellaris, *Tate, m.s.*	.	.	.	.	.	.	.	
" (Ocinebra) prionotus, *Tate*	1	.	.	.	.	.	.	
" (Muricidea) hypsellus, *Tate*	1	.	.	.	.	.	.	
Trophon cristatus, *Tate, m.s.*	.	.	.	.	.	.	.	
" cretaceus, *Tate, m.s.*	.	.	.	.	4	.	.	
Triton annectans, *Tate*, var.	.	.	.	3	4	.	.	
" cribrosus, *Tate*, var.	1	.	.	.	.	.	.	
Plesiotriton Dennanti, *Tate, m.s.*	.	.	.	.	.	.	.	
Fusus acanthostephes, *Tate*, var.	.	.	.	3	4	5	.	
" dictyotis, *Tate*	.	.	.	3	4	5	.	
Clavilithes incompositus, *Tate*	1	.	.	.	.	.	.	
" bulbodes, *Tate*	.	.	.	.	4	5	.	
" coronatus, *Tate, m.s.*	.	.	.	.	.	.	.	
Latirofusus cribrosus, *Tate, m.s.*	.	.	.	.	.	.	.	
" sparsicostatus, *Tate, m.s.*	.	.	.	.	.	.	.	
Sipho, n. sp.	.	.	.	.	.	.	.	
Tritonidea interlineata, *Tate, m.s.*	.	.	.	.	.	.	.	
Voluta anticingulata, *McCoy*	.	2	.	.	.	.	6	
" cribrosa, *Tate*	1	.	.	.	.	.	.	
" McCoyii, *T. Woods*, var.	.	.	.	.	4	5	6	
" pagodoides, *Tate*	1	2	.	.	.	.	.	
Mitra (Strigatella) Otwayensis, *Tate, m.s.*	.	.	.	.	.	.	.	
" " n. sp.	.	.	.	.	.	.	.	
" (Fusimitra) climakis, *Tate, m.s.*	.	.	.	.	.	.	.	
" (Conomitra) retrofracta, *Tate, m.s.*	.	.	.	.	.	.	.	
Marginella inermis, *Tate*	.	.	.	.	4	5	.	
" inequidens, *Tate, m.s.*	.	.	.	.	4	5	.	
" propinqua, *Tate*	.	2	3	4	5	.	.	
" Wentworthi, *Ten.-Wds.*	1	2	3	4	5	6		
" Woodsii, *Tate*	.	2	3	4	.	.	.	
Columbella Otwayensis, *Tate, m.s.*	.	.	.	.	.	.	.	
Cypræa ovulatella, *Tate*	1	.	.	.	.	.	.	
Trivia avellanoides, *McCoy*	1	2	3	4	5	6		
Erato australis, *Tate*	1	2	3	.	.	.	.	
" minor, *Tate*	.	.	.	4	.	.	.	
" pyrulata, *Tate*	1	.	.	.	.	.	.	
Conorbis quadrisulcatus, *Tate, m.s.*	.	.	.	.	.	.	.	
Borsonia Otwayensis, *Tate, m.s.*	.	.	.	.	.	.	.	
" polycesta, *Tate, m.s.*	.	.	.	.	.	.	.	
" protensa, *Tate, m.s.*	.	.	.	.	.	.	.	
Pleurotoma crenatulifera, *Tate, m.s.*	.	.	.	.	.	.	.	
" (Eopleurotoma) Mulderi, *Tate, m.s.* ...	Belmont							
" (Surcula) Johnstoni, *T. Wds.*, var. ...	.	2	.	.	.	6		
" " terebrellata, *Tate, m.s.* ...	.	2	.	.	.	.	.	
" " claræ, *Ten.-Wds.*	.	.	3	4	.	.	.	
Drillia sandleroides, *Ten.-Wds.*, var.	.	.	.	4	5	6		
Mangilia bidens, *T. Wds.*, var.	.	.	3	4	.	.	.	
Bela pulchra, *Tate*	.	.	.	4	.	6		
" gradata, *Tate, m.s.*	.	.	.	.	.	.	.	
" percorrugata, *Tate, m.s.*	.	.	.	.	.	.	.	

Bela recticostata, *Tate, m.s.*				.	.	.	.	.	.
" ephamilla, *Tate, m.s.*				.	.	.	.	.	.
" micra, *Tate, m.s.*				.	.	.	.	.	.
Cythara columbellæformis, *Tate, m.s.*				.	.	3	.	.	.
" sublavata, *Tate, m.s.*				.	.	.	.	.	.
Cancellaria perplexa, *Tate, m.s*				.	.	.	.	.	.
" cristata, *Tate, m.s.*				.	.	.	.	.	.
" fontinalis, *Tate, m.s.*				.	2	.	.	.	.
" dyscrita, *Tate, m.s.*				.	2	.	.	.	.
" n. sp.				.	.	.	.	.	.
Trichotropis subquadrata, *Tate*				.	.	.	4	.	.
Mesalia stylacris, *Tate*				1	.	.	.	.	.
Turritella Aldingæ, *Tate*				1	.	.	.	.	.
Mathilda cryptacris, *Tate, m.s.*				.	.	.	.	.	.
Natica Wintlei, *T. Wds.*				.	2	.	.	.	6
Eulima acutispira, *T. Wds.*				.	2	3	4	.	.
" Danæ, *T. Wds.*				1	2	3	4	5	.
" n. sp.				.	.	.	.	.	.
Colina fenestralis, *Tate*				.	.	3	4	.	.
Lovenella trigemmata, *Tate, m.s.*				.	.	3	4	.	.
" triserrata, *Tate, m.s.*				1	.	.	.	.	.
" terebræformis, *Tate, m.s.*				.	.	.	.	.	.
" n. sp.				.	.	.	.	.	.
" n. sp.				.	.	.	.	.	.
Cerithium, n. sp.				.	.	.	.	5	.
Potamides, n. sp.				.	.	.	.	.	.
Torinia Simsoni, *Tate, m.s.*				1	2	.	.	.	6
Turbo supracoronatus, *Tate, m.s.*				.	.	.	.	.	.
Astralium, n. sp.				.	.	.	4	.	.
Leptothyra, n. sp.				.	.	.	4	.	.
Trochocochlea acutilirata, *Tate, m.s.*				.	.	.	.	.	.
Calliostoma escharoides, *Tate, m.s.*				.	2	.	4	.	.
" n. sp.				.	.	.	.	.	.
Pleurotomaria, n. sp.				.	.	.	.	.	.
Tornatella scrobiculata, *T. Wds.*				.	2	.	4	.	.
Triploca ligata, *Tate*				1	.	.	.	.	.
Bulimella paucilineata, *Tate, m.s.*				.	2	3	4	5	.
" callosa, *Tate, m.s.*				1	.	.	.	.	.
Atlanta (operculum of)				.	.	.	.	.	.

SCAPHOPODA.

Entalis Mantelli, *Zittel.*				passim					
" subfissura, *Tate*				passim					
Dentalium aratum, *Tate*				passim					

LAMELLIBRANCHIATA.

Gryphæa tarda, *Hutton*				1	2	3	4	.	.
Pecten Foulcheri, *T. Wds.*				.	2	.	4	5	.
Amusium Zitteli, *Hutton*				passim					
Dimya dissimilis, *Tate*				.	2	3	4	5	.
Lima Bassi, *T. Wds.*				1	2	3	4	5	6
Pectunculus laticostatus, *Quoy*				.	2	3	4	5	.
Limopsis insolita, *Sow.*				1	2	.	.	.	.
Plagiarca Cainozoica, *Tate*				passim					
Barbatia, n. sp.				.	.	.	.	.	.
Nucula tumida, *T. Wds.*				.	2	.	4	.	6
Leda apiculata, *Tate*				1	2	.	4	.	6
" embolos, *Tate, m.s.*				.	2	.	.	5	.

Leda leptorhyncha, *Tate*	1	.	.	.	.	.
" obollela, *Tate*	.	2	3	4	5	.
Cardita polynema, *Tate*	.	2	3	.	5	.
" delicatula, *Tate*	.	2	3	4	5	.
Carditella radiata, *Tate*	1	2	.	.	.	.
Woodia globularis, *Tate, m.s.*	.	.	.	.	.	.
Verticordia echinata, *Tate, m.s.*	.	2	.	.	.	.
Trigonia tubulifera, *Tate*	.	2	3	4	5	6
Cytherea tenuis, *Tate*	1	2	.	.	.	.
Chione Cainozoica, *T. Wds.*	1	2	.	4	5	6
" multitæniata, *Tate*	1	2	.	.	.	.
Myodora lamellata, *Tate*	1	.	.	.	.	.
Saxicava arctica, *Linn.*	1	.	.	4	.	.
Corbula pyxidata, *Tate*	1	2	3	.	.	.

PALLIOBRANCHIATA.

Waldheimia insolita, *Tate*	1	2	3	4	5	.
" furcata, *Tate*	1	.	.	.	.	.
Terebratulina triangularis, *Tate*	1	.	.	.	.	.

ECHINODERMATA.

Leiocidaris Australiæ, *Duncan*	passim					

ZOANTHARIA.

Flabellum distinctum, *Ed. & H.*	1	2	3	.	.	.
" Victoriæ, *Duncan*	.	2	3	4	5	.
Notocyathus viola, *Dunc.*	.	2	.	4	.	.
Trochocyathus sp.	.	.	.	.	.	.
Deltocyathus Italicus, *Ed. & H.*	2	3	.	.	.
" Aldingensis, *Ten.-Wds.*	1	.	.	.	.	.
Conotrochus typus, *Sequenza*	.	.	3	.	5	.
" McCoyii, *Duncan*	.	2	.	.	.	.
Conosmilia anomala, *Dunc.*	.	.	3	4	5	.
" elegans, *Dunc.*	.	.	3	4	.	.
" striata (?), *Dunc.*	.	2	3	4	.	.
" n, sp.	.	.	.	.	.	.
Balanophyllia Australiensis, *D.*	.	.	3	4	.	.
" campanulata, *D.*	.	.	3	.	.	.
" cylindrica, *Michelin.*	.	.	.	.	.	.
" Selwyni, *D.*	.	2	3	.	.	.
" Ulrichi, *D.*	.	.	3	.	.	.
" tubuliformis, *D.*	.	.	.	4	.	.
" n. sp.	.	.	.	.	.	.

POLYZOA.

(Determined by Dr. Macgillivray.)

Phylochella (?) sp.	.	.	.	4	.	.
Cellaria contigua, *McG.*	.	2	3	4	.	.
" cucullata, *McG.*	.	.	.	.	.	.
" Dennanti, *McG.*	.	.	.	.	.	.
Lunulites biformis, *McG.*	.	.	.	.	.	.
Salenaria maculata, *Busk.*	.	.	.	4	5	.
" squamosa, *McG.*	.	.	.	4	5	.
" cupola, *Ten.-Wds.*	.	.	.	4	5	.
Adeona symmetrica, *Waters*	.	2	3	4	5	.
Tessaradoma elevata, *Ten.-Wds.*	1	.	3	4	5	.
Porina gracilis, *M. Edw.*	.	.	3	4	5	.

FORAMINIFERA

(Determined by Mr. W. Howchin, F.G.S., from examples selected and mounted by Mr. E. J. Bradley).

Biloculina ringens, *Lank.*
Miliolina circularis, *Bornem.*
" oblonga, *Montag.*
Cornuspira involvens, *Rss.*
*Sigmoilina tenuis, *Czjzek.*
*Reophax bacillaris, *Brady*
Haplophragmium pseudospirale, *Will.*
Textularia aspera, *Brady*
" sagittula, *Def.*
" sagittula, var. fistulosa, *Brady*
* " globulosa, *Ehr.*
†Spiroplecta annectans, *P. & J.*
Gaudryina pupoides, *d'Orb.*
*Bulimina ovata, *d'Orb.*
" elegantissima
Bolivina limbata, *Brady*
Cassidulina subglobosa, *Brady*
*Lagena acuticosta, *Rss.*
* " castrensis, *Sch.*
* " distoma, *P. & J.*
" globosa, *Montag.*
" gracillima, *Seg.*
* " hexagona, *Will.*
" lævis, *Montag.*
" marginata, *W. & J.*
* " orbignyana, *Seg.*
* " striata, *d'Orb.*
" sulcata, *W. & J.*
Nodosaria communis, *d'Orb.*
" consobrina, *d'Orb.*
* " hispida, *d'Orb.*
" lævigata, *d'Orb.*
* " obliquestriata, *Rss.*
*Nodosaria pyrula, *d'Orb.*
" radicula, *Linné*
" scalaris, *Batsch.*
" soluta, *Rss.*
Vaginulina legumen, *Linné*
*Rhabdogonium tricarinatum, *d'Orb.*
*Marginulina Pecketi, var. spinosa, *Schrodt.*
Cristellaria acutauricularis, *F. & M.*
" cultrata, *Montf.*
" Schlœnbachi, *Rss.*
Polymorphina communis, *d'Orb.*
" elegantissima, *P. & J.*
" gibba, *d'Orb.*
" lactea, *W. & J.*
" oblonga, *d'Orb.*
" problema, *d'Orb.*
*Uvigerina asperula, *Czjzek.*
Globigerina bulloides, *d'Orb.*
Pullenia quinqueloba, *Rss.*
" sphæroides, *d'Orb.*
Spirillina decorata, *Brady*
* " (?) limbata, var. denticulata, *Br.*
Discorbina biconcava, *P. & J.*
" turbo, *d'Orb.*
Truncatulina lobatula, *W. & J.*
Pulvinulina Hauerii, *d'Orb.*
* " Micheliniana, *d'Orb.*
" repanda, *F. & M.*
Nonionina umbilicatula, *Montf.*
Polystomella crispa, *Linn.*
" macella, *F. & M.*

In the above list of 64 species there are 19 species and one genus which have not hitherto been recognised within the Australian area. These additions to our foraminiferal fauna are indicated by an * for the species and † for the genus. The large number of species here indicated new to our Eocene beds (amounting to one-third of the whole) is a remarkable result. This is particularly noteworthy in the *Lagenæ*, for of the 11 species in the list more than half are noted for the first time. The genus *Spiroplecta* has a geological history dating from the Gault, and our species, *S. annectans*, was dredged by the Challenger in Torres Straits. *Reophax bacillaris* has not previously been recognised in a fossil condition, neither has *Spirillina limbata var. denticulata*, which appears to be represented in the material by one immature example. This form was also dredged by the Challenger both in Bass's and Torres Straits. Of the other new forms, *Nodosaria hispida* dates from the Trias, *Textularia globulosa*, *Lagena acuticosta*, and *Pulvinulina Micheliniana* from the Cretaceous, and the remainder have more or less of a Tertiary distribution. The interesting form *Marginulina Pecketi, var. spinosa* was discovered and described by Franz Schrodt, from the Pliocene beds of Garrucha, in the south of Spain (1890).

In addition to the list now published there are one or two forms in this interesting material which are probably undescribed, but are held over for further examination.

Aire River.

The principal object of our visit to the Cape Otway district this year was to observe the leaf-beds and shell-deposits recorded by the Geological Survey near the mouth of the Aire River, the Eocenes at Point Flinders having been examined on a previous occasion. Mr. Wilkinson records a leaf-bed 17 feet thick a mile and a half west of the river-mouth, and below this again a clay bed with fossils similar to those at Cape Otway. Prof. Duncan specially mentions six species of corals obtained from the clay, amongst which are three gathered by us at Point Flinders, the remaining three not appearing in any of our collections from the locality. Moreover, the existence of synclines and anticlines in the strata is indicated in the report, and also in the section accompanying it.

The geological sketch map previously mentioned is not only more definite, but very considerably enlarges the area occupied by the tertiaries in the neighbourhood of the Aire River. According to this map they extend uninterruptedly from the mouth of the river to Castle Cove, a distance of about three miles. No mere fringe on the sea beach is meant, as the coloring shows a width of fully a mile for the greater part of the distance.

To our great disappointment we were unable to find any tertiary outcrop either on the sea beach or on the top of the cliffs adjoining the beach. We traversed the beach from the river to Castle Cove, and found it occupied by rugged dune limestone for the greater part of the distance, not only in fallen fragments, but *in situ*, with the same rock occasionally extending seaward for a short distance. At the western end, in the vicinity of Castle Cove, this was succeeded by mesozoic strata. Most certainly the top of the cliffs should be marked Post-Pliocene (?recent) dune limestone capped by sandhills, but although, as said before, we were quite unable to discover any trace of Mr. Wilkinson's leaf or clay beds on the beach, it is, we admit, just possible that some such rocks may crop out beneath the dune limestone and become visible when the tide is very low. A guide, whom Mr. Robinson obligingly sent with us, professed to be able to find these clay beds, but after spending half the day in searching had to acknowledge himself puzzled, and offered the supposition that they had been either washed away or covered with sand since he last saw them.

From the existence of Eocene strata at Point Flinders, and also on the Ford River, close to the homestead, it is not unlikely that similar strata underlie the dune limestone on this part of

the coast. If so, they can only occur close to or below sea level, and not, as indicated on the sketch map, on the top of the cliffs, which are 200 feet high, and show Post-Pliocene or recent rocks from base to summit.

The only undoubted Tertiary outcrop seen by us at the Aire was that just referred to, which is an Eocene outlier of polyzoal limestone abutting against Mesozoic rock. *Waldheimia Garibaldiana*, *Pecten Foulcheri* and a cast of *Voluta Mortoni* were observed. Other outliers are shown on the map, viz., at Fischer's Point, and on the east side of the Aire, but as our time was limited we did not visit them, and no fossils have been recorded from either.

General.

Since the publication of Part I. of this "Correlation," an important paper on "The Sequence of the Eocene Rocks of Victoria," has been contributed by Messrs. Hall & Pritchard.* At Maude, as is well known, Tertiary deposits occur both above and below a layer of basalt, which has been described by the Survey as a subsequent intercalation, but this reading is disputed in the article referred to. The inferior of the two deposits is next correlated with the Spring Creek Section, which from its slightly lower percentage of recent species they assign to a much lower horizon of the Eocene than Muddy Creek, Schnapper Point, and certain other Tertiary outcrops.

For their calculations upon the Muddy Creek mollusca they rely partly upon a list of species published in 1888, and partly upon the figures given in Part I. of this "Correlation" in 1893, but some extensive researches made personally in January of this year enable us to correct the quoted figures, and supply the latest data. The shells recently gathered are not yet completly sorted, but, so far, the mollusca proper for the lower zone at Muddy Creek show a total of 649 species. Only eight of these, and not ten, as stated in the Maude article, are recorded to have living representatives, so that the percentage of existing species is 1·2, instead of 2, according to Messrs. Hall & Pritchard's calculations. One per cent. of recent species is claimed by the authors named for the Spring Creek fauna, which may be accepted as approximately correct, but it is obviously unwise to attempt a classification of Tertiary strata on a difference of less than a half per cent., or even, indeed, on 1 per cent. of existing forms. Should an alleged living representative be discredited, or a single fresh recent species be recorded, the percentage would be substantially altered. Muddy Creek, with its extremely rich fauna, would not be so much affected, but a moderately prolific bed like

* "The Older Tertiaries of Maude," &c., Proc. Roy. Soc. Vic., 1895.

that at Spring Creek would jump up or down, as the case might be, a half per cent. at once. Indeed, for one or two of the Muddy Creek species referred to, their identification with living forms is not absolutely positive, so that too much stress must not be laid on even this low percentage. Messrs. Hall & Pritchard's calculations for Spring Creek are based upon a total of 293 species of mollusca from the beds. Our list, corrected by supplying a few omissions, and adding the remainder of the Pleurotomidæ, gives 275 species, which is a fairly close agreement.

A sufficient number of species has now been elaborated from Muddy Creek and Spring Creek to allow of a comparison between them on a somewhat different basis, which may prove useful with such closely allied beds. The Miocene deposit resting upon the Eocene at Muddy Creek has, up to the present, yielded 244 species of mollusca, and that at Jemmy's Point about half this number. Now, it is curious to note that of the 275 species on our list for Spring Creek, 16, or 5·8 per cent., pass up into the Miocene, while out of the 649 species in the Muddy Creek Eocene, 30 species pass up, or only 4·6 per cent., which is unfavorable to the inferior horizon claimed for Spring Creek. In fact, the presence of such characteristic Miocene forms at Spring Creek as *Mactra axiniformis*, *Ancillaria orycta*, *Dosinia Johnstoni*, &c., is a distinct factor in the general facies of the fauna, and must be taken into account in estimating its age.

According to the summary at the end of their paper, Messrs. Hall & Pritchard make the Eocene sands of Muddy Creek rest upon the polyzoal rock, and this again upon the Older Volcanic. The Older Volcanic is wanting in South-Western Victoria, at least in the neighbourhood of the Tertiaries, the basal rocks, where visible, being either Mesozoic strata or a still more ancient porphyry, but the polyzoal limestone attains a much greater development there than in the Geelong District. Moreover, that this rock really underlies the Eocene sands may well be doubted; more probably it is coterminous with them. On the Grange Burn it is found at a low level certainly, but a section, seen at our last visit near the Falls in Muddy Creek itself, showed an apparent gradual passage from gastropod beds into typical polyzoal rock. The same is the case at Spring Creek, and presumably also at the North Belmont section, judging from its description in Messrs. Hall & Pritchard's paper.* Possibly, some sections in the Geelong District may show the rock in an inferior position, but this does not appear to be universal, especially in the Western District, where the formation is best studied.

It is notable that in almost every exposure of Eocene strata,

* Compare pages 191 and 194, Older Tertiaries of Maude.

as surely as gastropod beds are found, close at hand appears a polyzoal rock, as if there was some intimate connection between the two. On the whole, the latter is apparently a deeper sea deposit than the former, which can only be formed in shallower water. If this is the true explanation, a simultaneous deposition of the two kinds of strata may have taken place in closely adjoining areas.

In the above remarks, actual equivalence of geological age for the polyzoal rocks of separate localities is not necessarily implied, but see *infra*.

The correctness of our reading of the Spring Creek section, as given in Part I.,* is amply borne out by further observations made within the last few weeks by one of the present writers, in company with Mr. J. Mulder and the Rev. A. Cresswell.

At the south end of the section it will be remembered that the rugged Polyzoal rock passes gradually into slightly softer strata full of Echinoderms, but showing few other fossils, except an occasional bivalve. Similar strata, also containing numerous examples of Echinoderms, overlie the shell beds on the south side of "The Ledge," but owing to the dip and the increased steepness of the cliffs the fossils are there out of reach, and are only known from the fallen blocks lying upon the beach. From them, however, not only Echinoderms, but also mollusca in limited numbers have been gathered.

At a point still more to the south, known as the "Fishermen's Steps," from the fact that footholds have been cut in the Echinoderm rock, the cliffs are less abrupt and can be scaled with ease. Driven by the advancing tide from the usual collecting grounds to this locality, a perpendicular rock from 30 to 40 feet up the cliff was searched for Echinoderms, almost the only fossils visible. Overhead, and resting directly upon a projecting ledge at the top of this rock, a large quantity of broken bivalves showed, looking in the distance like the shells of a raised beach. By a little awkward climbing they were reached, and proved to be derived from an earthy bank overlying the echinoderm rock. Starting from the narrow ledge on the top of this rock, where the broken shells have accumulated, the fossiliferous earths and clays extend up the cliffs, with here and there a narrow band of hard rock alternating with the softer material. A somewhat similar alternation of rocky bands and clays is observable at the north end of the section, near the Bird Rock; the fossils in the clays there are, however, scarcer, and include some species not yet found at the Fishermen's Steps.

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* Correlation of the Marine Tertiaries of Australia. Roy. Soc. of South Australia, vol. XVII., pp. 206 *et seq.*

Nearly an hour was spent in collecting from the latter locality, and though the fossils are somewhat rotten, and with difficulty extracted whole, they are often entire before removal from the matrix, and are thus presumably *in situ*. Some large, strong shells and, as usual, very small ones came out perfect enough.

The following is a list of the determinable species obtained; those marked with an asterisk have been collected previously in the general section :—

*Voluta anticingulata
*Natica Wintlei
" polita
*Turritella septifraga
* " conspicabilis
Mathilda bicarinata
Odostomia Victoriæ
Eulimella gracillissima
Liotia Roblini
*Tinostoma parvula
*Eumargarita strigata
*Ringicula lactea
Volvulella sp.
*Entalis Mantelli
* " subfissura
*Dentalium bifrons
* " aratum
Spiralis tertiaria
*Dimya dissimilis
*Pecten Foulcheri
* " Murrayana
* " Hochstetteri
* " lucens
*Spondylus gæderopoides
*Nucula tumida
*Leda embolos
* " apiculata
*Limopsis Belcheri
*Pectunculus laticostatus
* " cainozoicus
*Barbatia interclathrata
*Cucullæa Corioensis
*Crassatella Hallii
*Cardita polynema
* " aff. C. solida
*Carditella inornata
*Chione multitæniata
* " Pritchardi
Corbula ephamilla
*Salenaria, two sp.
*Vincularia, sp.
*Flabellum Victoriæ
*Placotrochus deltoideus
Notocyathus sp.
*Deltocyathus Italicus
*Bathyactis discus
*Cornuspira involvens
*Biloculina depressa
*Miliolina seminulum

Out of 39 species of mollusca here recorded eight appear in the section for the first time, which is a rather large percentage of fresh species for an hour's collecting. Some remarks upon this matter will be made later on. Many of the most characteristic Spring Creek shells are, however, represented.

Since the molluscan beds thus *overlie* as well as *underlie* the echinoderm rock the latter cannot be assigned to either a higher or lower horizon, but must be regarded as practically of equivalent geological age, and its different lithological character as well as the greater prevalence of certain species of fossils, together with the scarcity or absence of others, may be due to change in the sediments, and probably also to oscillations of level in the area of deposition during the Eocene period.

The only other point on which any difference of opinion can exist is as to the relationship of the Echinoderm and Polyzoal rocks. Possibly there are some slight lithological differences between them, but, as is well known, variations of this kind are not

to be trusted as a test of geological age. Echinoderms, which are the principal fossils recognisable, have been collected from the Polyzoal rock, chiefly on the north side of Spring Creek, where it is typically developed, and prove to be the same as those from the rock face at Fishermen's Steps. In addition, a few brachiopods, polyzoa, fragments of bivalves, &c., have been extracted from the same rugged rocks, but no species unrepresented in the accompanying strata have so far been noticed. On palæontological grounds, therefore, its separation from the adjoining Echinoderm rock does not seem feasible.

It is well known that the molluscan beds of Spring Creek, Curlewis, Mitchell River, Muddy Creek, &c., though agreeing in broad general characters, exhibit in each case certain faunal peculiarities, and when the polyzoal rocks accompanying them respectively are critically examined and compared, which is only partially done at present, considerable variation in their fossil contents will, no doubt, also be shown. For Muddy Creek and Spring Creek this can be already asserted—in fact, the polyzoal rock of Muddy Creek and the Grange Burn might with almost equal propriety be styled nummulitic limestone, from the abundance of *Nummulites variolaria* contained in it.*

Attention has at various times been drawn to the probability that minor zones exist in the respective Eocene deposits of Victoria. From the various observations recorded, it appears futile to seek them in any supposed undeviating sequence of the molluscan beds and their accompanying polyzoal rocks, the presence of one or the other in particular areas being probably dependent on bathymetrical conditions, but in the shell beds themselves, with their extremely rich fauna, the problem may possibly be attacked with greater chance of success. At Muddy Creek some work has been done in this direction, though, so far, with indefinite results; but from the great height of the exposure at Spring Creek, fully 200 feet, a good opportunity is afforded for comparing the fauna of different levels. Along the whole section fallen blocks from the upper levels strew the beach, and hitherto collectors have mixed indiscriminately the fossils yielded by them with those gathered *in situ* from the lower part of the cliffs, the theory being that the fauna was practically indivisible.

When collecting at the Fishermen's Steps, the most characteristic shell obtained was *Crassatella Hallii*, which is very abundant, though rare at lower levels. Other species, as *Liotia Roblini*, *Corbula ephamilla*, *Natica polita*, &c., have not been previously recorded from the Spring Creek section, and we offer the suggestion that at this level, and above the echinoderm rock,

*Trans. Aust. Assoc. Adv. Science, Melbourne Meeting, pp. 442, 443.

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a minor zone of the Eocene may possibly be demonstrated—at any rate, the matter is worthy of further research.

At the north end of the section, in the topmost clays, near Bird Rock, Mr. Mulder has pointed out that *Ancillaria hebera* is a very frequent shell, though quite rare in other parts of the beds. Further peculiarities of the fauna have also been traced, which induce him to think that these clays mark a minor zone of deposition.

Appendix.

In No. VIII. of the Progress Reports of the Geological Survey of Victoria issued last year, notes (accompanied by a list of fossils) are contributed by Mr. James Stirling concerning the age of the lower members of the Tertiaries in Victoria, in the course of which some remarks by Professor McCoy, criticising adversely our views on the subject, are quoted. His criticisms are unsupported by any argument worthy of the name, and mainly consist in an oracular repetition of opinions expressed by him 30 years ago, before a tithe of the fossils now listed had been described or even discovered.

We are told that we argue in a circle, and that the pure assumption was first of all made that Muddy Creek and Schnapper Point were Eocene, the other beds resembling them of course then coming into the same category. We can only characterise such a remark as a simple impertinence.

Sir F. McCoy appears to object to any Australian deposits being called Eocene unless the fossil species are identical with those occurring in the London Clay, Paris Basin, or other European Eocenes, peculiar Australian species being open to grave suspicion. The Australian fauna and flora are markedly peculiar at the present day, and is it likely that a different state of things obtained in Eocene times?

It is further said that, as an examination of the polyzoa just completed shows 12 per cent. of recent species in the Muddy Creek and Schnapper Point beds, these cannot be Eocene. We have not yet seen the descriptions alluded to, but remark that the polyzoa are not an accepted basis for the classification of Tertiary strata.

Finally, we make the emphatic statements, and challenge Sir F. McCoy to disprove them, (1) that the proportion of recent species in the Muddy Creek and Schnapper Point beds is less than $3\frac{1}{2}$ per cent., which is Sir Charles Lyell's limit for an Eocene fauna; and (2) that the facies of their mollusca is characteristically Eocene when compared with those of the Paris Basin.

Treatment after Circumcision in the Hermit Hill Tribe, Daly River, Northern Territory.

By Knut Dahl.

Communicated by E. C. Stirling, M.D.

[Read July 2, 1895.]

One day in rambling through the swampy woods to the south of the Daly River I came across a small encampment of blacks belonging partly to the Hermit Hill and partly to the Mollak Mollak tribes. In the camp were two boys—brothers—who had recently been circumcised; besides these there were an old woman, their mother, three or four young male relatives, and a lubra belonging to one of the two boys. The convalescents were sitting on the ground under a tree, each with his penis in a paper-bark bandage fastened on to his belt with a frequently doubled piece of twine made out of hair. Their sad and dejected features lit slightly up when I presented them with a piece of tobacco, and upon my request one of the boys began to remove the curiously arranged bandage. He first undid the strings of fibre which encircled the strap of hair-twine and paper-bark, then removed the paper-bark, and exposed a little mat of woven grass that was wrapped round an inner layer of very fine paper-bark next to the wound. The penis was greatly swollen and in a state of inflammation that seemed to cause the boy great suffering. I was just wondering what means they used for healing such a painful and, if neglected, serious wound, when my eye rested on a sheet of paper-bark which I ascertained covered a hole dug in the ground about a foot in depth and width. In the centre of the sheet of paper-bark was a hole about two inches in diameter and burnt at the edges. On my inquiring the use of such an arrangement, the boy answered, "Him cook him 'long hot fellow stone." I asked when the performance would take place. "Close up," he said; so I sat down, anxious to see this radical treatment put in practice, and waited until some stones which were lying in the fire were sufficiently heated. When the stones were glowing a boy brought some wet moss from an adjacent lagoon. The paper-bark sheet was then removed from the hole, some old rubbish raked out, and some wet moss put in its place. Two or three of the red-hot stones were then thrown into

the hole, covered up with more wet moss, and some water poured in. Presently the paper-bark sheet was replaced, with the hole over the centre of the cavity, through which a column of hot vapor ascended. In the meantime one of the circumcised boys had removed all the bandages from his penis, walked to the paper-bark sheet, and laid flat upon it, with his penis inserted through the steaming hole; his arms were along his sides, the palms clasping the thighs, and the toes turned towards the axis of the body. During the five to ten minutes in which the hole continued to emit its vapor a convulsive shivering several times shook the aboriginal's body, and the young man, or rather boy, who superintended the performance then laid himself on the top of the patient, and so prevented any attempt to rise.

Notes on Carabidæ from Lake Callabonna, Central Australia.

By Thomas G. Sloane.

Communicated by Rev. T. Blackburn.

[Read July 2, 1895.]

The interesting collection of *Carabidæ* made by Mr. A. Zietz, of the Adelaide Museum, at Lake Callabonna in September, 1893, has been placed in my hands for examination; and I offer the following notes as the result of my investigation of the thirty-seven species contained therein. The types of the new species belong to the Adelaide Museum.

Neocarenum Blackburni, *n. sp.*

Elongate, robust, parallel, convex; prothorax a little wider than long, widely rounded behind; elytra convex, smooth, impunctate, base deeply emarginate; anterior tibiæ bidentate; intermediate tibiæ strongly bidentate externally. Black.

Head large, transverse (4·5 x 6·5 mm.), lightly convex, smooth, transversely impressed across occiput; frontal sulci deeply impressed, strongly curved, diverging greatly backwards, anterior part of their course very lightly marked, and not reaching margin of head; space between frontal sulci wide, not elevated; pre-ocular sulcus widening into a broad depression anteriorly; pre-ocular process forming a strong triangular projection; eyes deeply enclosed in orbits; lower edge of orbit thick, and forming a ridge below posterior part of eye; suborbital channel (to receive antennæ) oblique, very deep, distant from eye; two supra-orbital punctures on each side placed close together at base of space between frontal sulci and eyes; genæ (between suborbital channel and buccal fissure) divided from submentum, striate. Labrum with anterior margin rounded and advanced in middle. Labial palpi with last joint widely securiform. Antennæ thick, moniliform, incrassate; joints 5-11 compressed, grooved on edges, second joint very little longer than third. Prothorax a little broader than long (7·7 x 8 mm.), widest a little behind anterior angles, lightly convex, not declivous behind; sides almost parallel between marginal punctures, a little narrowed to base behind posterior marginal puncture; anterior margin truncate; base wide, evenly and lightly rounded; anterior angles widely rounded, not marked; posterior angles very obtuse, lightly

marked; border thick, extending round anterior angles and across base, very little reflexed on sides, more strongly so between the posterior marginal punctures (*i.e.*, on base and posterior part of sides), thickened and most prominent at basal angles; marginal channel wide on sides, narrow on base; median line linear, very lightly impressed; two marginal punctures on each side, the anterior about 1·5 mm. from anterior angle, the posterior about same distance from posterior angle. Elytra of same breadth as prothorax (14 x 8 mm.), widest behind middle, a little narrowed to base, widely rounded at apex, very convex, impunctate, sub-opaque (covered with minute scratches); base roundly and deeply emarginate between shoulders, abruptly declivous to peduncle; shoulders prominent; lateral border finely reflexed; a row of umbilicate punctures along lateral margin, two punctures on basal declivity of each elytron about middle of width; inflexed margin narrow behind first ventral segment. Prosternum sloping to peduncle (not vertical on base), widely and lightly excavate between coxæ. Ventral segments smooth, impunctate; suture between second and third well marked in all its course. Legs not long, rather heavy; femora compressed; anterior short, wide, thick, very lightly sinuate on lower side near apex; anterior tibiæ wide towards apex, bidentate; external ridge forming a slight but marked projection above upper external tooth; inferior ridge weakly developed, irregular, not serrate; apical plate forming a thick prominent projection below tarsus; intermediate tibiæ thick towards apex, strongly bidentate externally, the anterior tooth at apex, the upper (strong, erect, triangular) about apical third; posterior coxæ and trochanters impunctate.

Length, 28; breadth, 8 mm.

This species differs conspicuously from *N. elongatum*, Macl., in having the elytra without the submarginal row of large punctures, and in having the intermediate tibiæ bidentate externally. In these respects it resembles *N. retusum*, Bates, to which it is evidently closely allied; but, judging from the description of *N. retusum*, differs in the anterior tibiæ, which are bidentate externally, not tridentate (in *N. Blackburni* the external ridge forms a rather prominent, though not dentate, projection above the upper external tooth, but the tibiæ cannot be said to be tridentate), and have the inferior ridge and apical plate not differing much from those of *N. elongatum*, not with "two broad conspicuous teeth," as in *N. retusum*. *N. Blackburni*, too, seems a more convex species, and probably has the humeral angles of the elytra less strongly dentate. From *N. parviceps*, Sl., a species that has the elytra impunctate, it differs greatly in facies, being more convex, the head larger, with the eyes more deeply embedded n the orbits, the prothorax less transverse, the intermediate

tibiæ bidentate externally, &c. A specimen of this species was also brought from Ayer's Rock by the Horn Exploring Expedition of 1894.

Pogonus hypharpagioides, *n. sp.*

Male. Oval, robust; head large, convex; prothorax a little broader than long, not sinuate on sides before base, apex and base of equal width (1·5 mm.); elytra striate, the striæ simple, obsolete near base, a short striole at base of first interstice, third interstice tripunctate.

Testaceous. Head smooth, convex, broad across base, widely and feebly impressed on each side between antennæ; clypeal suture distinct; clypeus large, truncate; eyes convex, not prominent, lightly enclosed behind. Mandibles stout, hooked at apex; scrobe with a setigerous puncture towards apex. Labrum transverse, subtruncate (very lightly emarginate), sexsetose on anterior margin. Mentum with a short wide emarginate median tooth. Palpi: maxillary with penultimate joint a little longer than apical, incrassate; apical joint dilatate about basal third, narrowed to apex (apex obtuse); labial with penultimate joint long, narrow; apical joint shorter than penultimate, subcylindrical, dilatate in middle, narrowed to apex, subtruncate. Antennæ rather short, subfiliform; first four joints cylindrical; first much thicker than others, about as long as third; second shorter; seven apical joints of about equal length, compressed; three basal joints glabrous (a few long setæ at apex of third). Prothorax a little broader than long (2 x 2·1 mm.), widest a little before middle, smooth, convex; anterior margin truncate; base roundly truncate; sides lightly rounded; anterior angles obtuse, very close to head; basal angles obtuse; border narrow and reflexed on sides, thick and not reflexed on base, a short projecting prominence on each side just before basal angles bearing the posterior marginal puncture; marginal channel very narrow, passing evenly round each basal angle; median line linear, lightly impressed; lateral basal impressions near each basal angle, wide, round, shallow, a wide, transverse impression connecting them. Elytra convex, short, oval (4·5 x 2·8 mm.), widely and evenly rounded at apex; base truncate, much wider than base of prothorax; three inner striæ strongly marked on disc, fourth and fifth very lightly marked, sixth and seventh obsolete; the striæ obsolete, or very faint, towards base, and faint on apical declivity; eighth stria deeply impressed, diverging from margin some distance behind shoulders; three inner interstices a little convex in middle of length, ninth wide, convex, punctate on course of eighth stria; border narrow; basal border with posterior margin sloping forward on each side to humeral angles. Legs light;

tarsi setose on upper surface, two basal joints dilatate and squamulose beneath.

Length, 7·25; breadth, 2·8 mm.

This species has a general resemblance to the species of the genus *Hypharpax;* it is very distinct from the two previously described Australian species. I am inclined to believe the specimen before me to be immature, and think it possible the proper color of the insect may prove to be much darker. The penultimate joint of the labial palps seems to have about four setæ on the inner side; of these the two nearest the apex are close together, and the joint is a little incrassate towards the apex after them.

Pogonus Zietzi, *n. sp.*

Narrow, elongate, depressed; prothorax cordate; elytra flat on disc, lightly striate, a striole at base of first interstice, third interstice tripunctate.

Head and prothorax piceous brown; elytra pale-testaceous, infuscate near scutellum; legs testaceous; antennæ ferruginous. Head transverse, a little narrowed behind eyes, smooth; clypeal suture obsolete; clypeus feebly impressed on each side near base of mandibles; eyes prominent. Mandibles short, stout, hooked at tip; scrobe with a setigerous puncture towards apex. Ligula transverse, truncate, two long setæ placed together in middle; paraglossæ narrow, extending a little beyond ligula. Mentum deeply emarginate, with a short, simple, widely-triangular median projection. Maxillæ sharply hooked at apex, fringed with hairs on inner side; outer lobe biarticulate. Palpi: maxillary with penultimate joint cylindric, incrassate; apical joint thick, obtusely truncate, about same length as penultimate; labial with penultimate joint narrow, elongate, three fine setæ on inner side; apical joint shorter, subcyclindrical, lightly arcuate on outer side, dilatate in middle, apex thick, obtusely truncate. Labrum short, transverse, sub-truncate (hardly emarginate). Antennæ slender, elongate, filiform, very lightly compressed; first joint thick, about as long as third; second shorter; two basal joints glabrous; third pubescent on apical half. Prothorax smooth, cordate (1·25 x 1·5 mm.), widest considerably before middle, depressed on disc, truncate in front and behind; sides shortly rounded to anterior angles, evenly and decidedly narrowed to base; anterior angles rounded off; basal angles not marked; lateral border finely reflexed; lateral channel narrow, terminating a little before the actual base at posterior marginal seta; median line fine, lightly impressed; lateral basal impressions short, wide, extending to margin at basal angles; space between each basal impression and margin not carinate. Elytra narrow, parallel (3·6 x 2 mm.), flat on disc, evenly rounded at apex; base trun-

cate; humeral angles rounded; striæ finely impressed, two inner distinct and punctulate on disc, others weak (or obsolete), only first attaining apex, eighth weak on sides, its course well marked and punctate towards apex; ninth interstice with a few fine punctures on apical curve. Femora dilatate in middle. Male with two basal joints of anterior tarsi dilatate and squamulose beneath.

Length, 6·5; breadth, 2 mm.

This species might at first sight be taken for a species of *Dromius;* indeed, its appearance is so different from the other Australian species of *Pogonus* that it probably should be referred to a different genus, but, as I have been unable to see any of the recent studies of the Pogonides, I prefer to leave it in the genus *Pogonus*.

Note.—I believe the four described Australian species of *Pogonus* are now before me, therefore the following tabulation of them may be useful:—

A. Prothorax with sides strongly sinuate before basal angles (color of upper surface green).
  b. Form rather broad, depressed; prothorax with a short elevated ridge on inner side of lateral channel near basal angles. ... ... *cardiotrachelus*, Chaud.
  bb. Form narrow, cylindrical; prothorax without a sub-lateral ridge near basal angles. ... *australis*, Chaud.
AA. Prothorax without any lateral sinuosity before base.
  c. Form stout, convex. ... ... *hypharpagioides*, Sl.
  cc. Form narrow, depressed. ... ... *Zietzi*, Sl.

Loxandrus australiensis, *n. sp.*

Oval, depressed; prothorax not punctate on sides of base, transverse, apex and base of equal width (2 mm.); elytra oval, crenulate-striate, third interstice unipunctate (the puncture placed considerably before the middle). Black, shining; tarsi, antennæ, and palpi piceous.

Head smooth; eyes convex, prominent. Prothorax lightly transverse (2·2 x 2·6 mm.), widest just behind anterior marginal puncture, smooth, lightly convex; sides strongly rounded, lightly narrowed in front, obliquely and decidedly narrowed to base; anterior margin subtruncate (hardly emarginate); base truncate; basal angles obtuse; border narrow, reflexed, obsolete on middle of anterior margin and on base between lateral impressions marginal channel very narrow; median line lightly impressed in middle, not reaching base or apex; lateral basal impressions elongate, narrow, deep; posterior marginal puncture at basal angle (border not widened to receive it). Elytra broad, oval (5·7 x 4 mm.); apical curve decidedly sinuate on each side;

striæ deeply impressed (fifth, sixth, and seventh weaker), strongly crenulate, first flexuous (curving towards suture) near base, seventh obsolete towards shoulder for about one-fourth of length; interstices flat, four inner ones a little convex, ninth punctate along course of eighth stria; border narrowly reflexed on sides, very little raised at humeral angles, and joining the basal border in a wide, not angular, curve. Mestasternum (on posterior parts of sides), metasternal episterna, and ventral segments punctulate.

Length, 10; breadth, 4 mm.

Only two of the described species of *Loxandrus* from Australia are known to me, viz., *L. atronitens*, Macl., and *L. iridipennis*, Casteln. Of these *L. atronitens* has the basal part of the prothorax punctulate, and the interstices roundly convex—features that at once separate it from *L. iridipennis* and *L. australiensis*. The conspicuous difference between *L. iridipennis* and *L. australiensis* is in the shape of the prothorax. *L. iridipennis* has the base of the prothorax evidently wider than the apex, the sides being very lightly narrowed to the base, the border extends along the base, is wide on the sides, increasing in width backwards from the anterior marginal puncture and becoming explanate at the basal angles, where it has the posterior marginal puncture placed upon it; while *L. australiensis* has the prothorax more convex, much more strongly rounded on the sides, decidedly narrowed to the base, the border narrow (never explanate), and obsolete on the middle of the base; it has the anterior angles, too, wider and less advanced, and the antennæ a little stouter. The basal border of the elytra is weaker in *L. australiensis* than in either *L. iridipennis* or *L. atronitens*, and the humeral angle is more rounded, with a finer border, which joins the basal border in a rounded curve without a perceptible angle. (The seventh stria of the elytra is obsolete for a considerable distance behind the shoulder; there are sometimes traces of this in specimens of *L. iridipennis*).

Rhytisternus obtusus, *n. sp.*

Oblong, rather convex; prothorax cordate, base (2·8 mm.) narrower than apex (3 mm.); elytra with four inner striæ of each very strongly impressed, the interstices convex. Black, shining; tarsi piceous; palpi and antennæ reddish-piceous.

Head convex, obsoletely transversely impressed behind vertex; frontal impressions strong, diverging backwards; eyes reniform, not so prominent as usual in the genus. Prothorax cordate, transverse (3 x 3·8 mm.), widest about middle, convex, declivous to base; disc lightly transversely striolate; sides rounded on anterior two-thirds, decidedly and obliquely narrowed on posterior third; anterior margin truncate; base sub-truncate, rounded to

basal angles, these obtusely rounded; lateral border thick; lateral channel extending to base; two lateral basal impressions of each side deep, inner short, curving outwards, external elongate-foveiform; space between external basal impression and margin narrow, convex; posterior setigerous puncture placed at extremity of lateral channel. Elytra oval (8 x 4·8 mm.), depressed on disc, more strongly declivous than usual in genus on sides, on base (at each side of scutellum) and at apex; sides subparallel (very lightly rounded); base truncate; apical curve lightly, but decidedly, sinuate on each side; five inner striæ entire, 1-4 deeply impressed, sixth and seventh obsolete, their course hardly indicated, except at apical extremity; fourth interstice convex; lateral border lightly reflexed; basal border joining lateral border at humeral angle with a slight interruption, but without any prominence. Prosternum truncate at base; a linear transverse impression just before base. Ventral segments roughly punctulate, the puncturation extending across the three apical segments.

Length, 13; breadth, 4·8 mm.

This species must be closely allied to *R. cardwellensis*, Blkb., with which it agrees in having the prothorax narrower across the base than across the apex. Judging by Mr. Blackburn's description, the following appear differences between these two species:—The sides of the prothorax in *R. cardwellensis* are described as sinuate before the basal angles—in *R. obtusus* they are not sinuate; and the basal angles of the prothorax, though obtuse, are marked in *R. cardwellensis*—in *R. obtusus* they are quite rounded off. The type of *R. cardwellensis* in Mr. C. French's collection is a male, so that it is possible *R. obtusus* may prove the female of that species, but this I consider extremely unlikely.

Two female specimens were in the collection, one of these (now in my collection) has the striæ of the elytra strongly punctulate, the other (the type) has the striæ a little crenulate; this I think may be a *post-mortem* effect produced by immersion in alcohol, and might not be found in fresh specimens.

Note.—Since the above description was written I have been in Sydney, and have seen the types of *Rhytisternus (Omaseus) Froggatti*, Macl.; the impression left upon me by an examination of that species is that *R. obtusus* is possibly identical with it. However, till specimens are compared, or the range of the species determined, it will be safer to allow *R. obtusus* to retain its specific name, with a query as to the possibility of its identity with *R. Froggatti*.

RHYTISTERNUS STUARTI, *n. sp.*

Oblong, very depressed; prothorax quadrate-cordate, sides sinuate behind, basal angles rectangular, base (3·3 mm.) wider than apex (3 mm.); elytra with four inner striæ of each entire and strongly impressed. Piceous black, shining; legs and antennæ piceous.

Male. Head moderate, convex; frontal impressions deep, short, diverging backwards, connected in front by the lightly marked clypeal suture; clypeus declivous to labrum; eyes prominent. Prothorax transverse (3·3 x 4·75 mm.), widest a little behind anterior marginal puncture, lightly convex towards sides anteriorly, depressed posteriorly; disc depressed, transversely striolate; sides lightly rounded on anterior three-fourths, lightly sinuate before base; anterior margin widely emarginate; base sinuate, lightly emarginate across peduncle, and sloping forward to the basal angle on each side; anterior angles obtuse; basal angles almost rectangular, their summits obtuse; lateral border thick, reflexed in front of basal sinuosity; median line lightly impressed; two lateral basal impressions placed in a wide depression on each side; the internal short, strongly impressed; the external more strongly marked, wide and arcuate; space between internal basal impressions lightly convex, that between external impression and margin narrow, convex, bearing at its base the posterior marginal puncture. Elytra depressed, wider than prothorax (9 x 5·7 mm.); sides subparallel, decidedly narrowed to humeral angles; base truncate; apical curve lightly and widely sinuate on each side; striæ simple, four inner ones strongly impressed, entire, fifth lightly impressed, sixth and seventh obsolete, except posteriorly, ninth and marginal channel as usual in genus; interstices flat; lateral border narrow, reflexed; basal border forming a prominent obtuse projection at each humeral angle above its junction with lateral border. Prosternum truncate at base; a linear impression just before basal margin, causing the base to appear weakly bordered. Ventral segments smooth in middle, finely rugulose-punctate laterally.

Length, 14·5—15·25; breadth, 5·7—6·1 mm.

The female is a little wider than the male, but does not differ otherwise, except sexually as usual in the genus.

In shape and general appearance, this species is closely allied to *R. carpentarius*, Sl., the conspicuous differences being that only the four inner striæ of the elytra are strongly impressed (not five as in *R. carpentarius*), and none of the interstices is convex (in *R. carpentarius* the five inner are); it is, besides, a smaller and much flatter insect, and has the sinuosity of the apical curve of the elytra less marked. From *R. liopleurus*, Chaud., its more depressed form and more transverse prothorax

decidedly separate it. It also resembles *R. callabonnensis*, Sl., but may be readily distinguished by its larger size, more depressed form, and the shape of the prothorax, which is broader, more quadrate, and strongly sinuate behind, with much more prominent basal angles.

Named in memory of the greatest explorer of Central Australia, John McDouall Stuart.

RHYTISTERNUS CALLABONNENSIS, *n. sp.*

Oblong, depressed; prothorax subcordate, base (3 mm.) a little wider than apex (2·75 mm.), basal angles obtuse, but marked; elytra with four inner striæ impressed, the interstices flat; ventral segments strongly rugulose-punctate. Black, shining; tarsi and palpi reddish-brown; antennæ piceous.

Male. Head moderate, convex; frontal impressions short, strong, diverging backwards, connected in front by the clypeal suture; clypeus strongly declivous to labrum; eyes prominent. Prothorax transverse-cordate (2·9 x 3·9), widest a little behind anterior marginal puncture, convex towards sides; disc depressed posteriorly, obsoletely transversely striolate; sides rounded, lightly subsinuate before basal angles; anterior margin emarginate; base subtruncate (hardly emarginate) across peduncle, sloping forward to the basal angle on each side; anterior angles obtuse, rather more prominent than usual in the genus; basal angles obtuse; lateral border narrow, thick; lateral channel ending posteriorly considerably before the base; median line lightly impressed; two lateral basal impressions placed in a wide depression on each side; internal deeply impressed, lightly arcuate; external shorter, arcuate, parallel with lateral margin posteriorly; space between internal impressions depressed, but a little convex, that between external impression and margin convex anteriorly, not raised above lateral border posteriorly, bearing at its base a foveiform setigerous puncture. Elytra oval (8 x 5 mm.), shortly narrowed to humeral angles, subconvex (disc depressed); sides subparallel; base truncate; apical curve decidedly sinuate on each side; four inner striæ strongly impressed, simple, entire, fifth, sixth and seventh obsolete, except near apex; four inner interstices flat, hardly convex (sometimes a little convex); basal border forming a decided, though obtuse, prominence above its junction, with lateral border at humeral angle. Prosternum truncate at base, widely transversely impressed just before basal margin. Ventral segments closely punctate; the puncturation coarse near sides, fine but continuous across middle.

Length, 13·3; breadth, 5 mm.

The female is a little flatter than the male, and is not easily separated from the female of *R. Stuarti*, Sl.

Closely allied to *R. splendidus*, Blkb., from which I would note the following characters as distinguishing it; *(a)* the prothorax has the basal angles a little more marked, and the sides faintly sinuate before them, *(b)* the elytra have the fifth stria less strongly impressed, *(c)* the ventral segments are opaque, not smooth in the middle, and not impressed with a transverse sulcus. It must, judging from the description, have a considerable affinity to *R. cardwellensis*, Blkb., but that species has the prothorax more dilatate at its widest part, and narrower at the base.

RHYTISTERNUS ARNHEIMENSIS, *Casteln?*

Male. Narrow, elongate, rather depressed; prothorax long, subcordate, base and apex of equal width (2·3 mm.), sides sinuate posteriorly; elytra with five inner striæ entire. Black, shining; legs and antennæ reddish-piceous.

Head rather long, widely and obsoletely impressed across occiput; frontal impressions moderate, wide apart, diverging backwards, their apices connected by the strongly marked clypeal suture; eyes (with orbit) reniform, less prominent than usual in the genus. Prothorax narrow, subcordate (2·7 x 3·2 mm.), widest a little before the middle, depressed posteriorly; sides very lightly rounded, lightly sinuate before base; anterior margin hardly emarginate; base sinuate, a little emarginate in middle and sloping lightly and roundly forward to basal angles on each side; anterior angles less obtuse than usual in the genus; basal angles well marked, obtuse at summit; lateral border narrowly reflexed; inner lateral basal impression not strongly marked, linear; spaces between them and margin on each side flat (external basal impression obsolete). Elytra oval (6·8 x 4 mm.), depressed on disc; apical curve sinuate on each side; five inner striæ simple, entire, first and second most strongly impressed, sixth and seventh only decidedly marked posteriorly (their course perceptible nearly to base); interstices flat on disc (two inner ones a little convex), five inner ones convex on apical declivity, ninth narrow, convex, punctate, the punctures interrupted in middle; lateral border narrow, reflexed; basal border interrupted at junction with lateral border. Prosternum roundly sub-truncate, not margined at base. Ventral segments opaque, minutely punctate; this puncturation more marked on basal segments, wanting in middle of segments.

Length, 12; breadth, 4 mm.

The species described above I believe to be *Rhytisternus (Omaseus) arnheimensis*, Casteln., but the description of that species is, unfortunately, too vague to be of any use in identifying

it. The type of *R. arnheimensis* is in the Howitt Collection, where I have seen it, and so know it to be a species of *Rhytistemus*, of narrow shape, with the prothorax cordiform and sinuate before the basal angles.*

Phorticosomus grandis, *Casteln.*

Several specimens of a *Phorticosomus*, which seems certainly *Ph. grandis*, Casteln., were obtained by Mr. Zietz; one of these is before me, from which I make the following notes as supplementary to de Castelnau's brief description.

Brown. Prothorax broader than long (4·6 x 5·6 mm.), subcordate, truncate on base, a little wider across apex (5·2 mm.) than base (5 mm.); sides lightly sinuate before basal angles; anterior angles projecting; basal angles rectangular, and decidedly marked. Elytra lightly striate; the interstices flat; base truncate; humeral angles not marked; basal border hardly arcuate on posterior margin from fourth stria to humeral angle; abbreviated stria at base of second interstice very short, punctiform.

Length, 18; breadth, 7 mm.

Hypharpax habitans, *n. sp.*

Male. Narrow, parallel, depressed; prothorax rounded on sides, posterior angles widely rounded, base and apex of equal width (1·5 mm.); elytra deeply striate, interstices without a striole at base of second or a puncture on apical part of third; prosternum punctulate before coxæ.

Black, shining; undersurface and femora piceous-black; tibiæ piceous-brown; antennæ, palpi, and labrum light-brown. Head small; mandibles inconspicuous, hidden by labrum; front with a narrow short oblique impression on each side extending backward towards middle of eye; these impressions connected by the well marked clypeal suture; eyes convex, not very prominent. Antennæ long. Labrum quadrate; anterior margin emarginate. Prothorax smooth, subrotundate, lightly transverse (1·8 x 2·2 mm.), widest a little before the middle, depressed on disc, strongly declivous on sides anteriorly; sides rounded, the curvature extending to the peduncle posteriorly; anterior margin widely and lightly emarginate; base truncate across peduncle; anterior angles obtuse, not marked; basal angles not marked; border narrow, extending along the base; marginal channel very narrow; a wide round well-defined impression (punctate at

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* I believe Mr. Waterhouse, who collected *R. arnheimensis*, obtained it when with one of the early transcontinental exploring expeditions; if so, the locality, Arnheim's Land, may be erroneous.

bottom) on each side of base. Elytra very little wider than prothorax (4·2 x 2·5 mm.), parallel on sides, depressed on disc, declivous on sides, lightly declivous to apex; base truncate; shoulders rounded; sinuosity of apical curve obsolete; striæ very deeply impressed, first hardly deflected towards suture near base, ninth interstice punctate towards shoulder and on apical third; lateral border narrow. Prosternum covered with a fine puncturation before coxæ; episterna smooth. Metasternum rugulose in middle and finely punctulate towards sides. Ventral segments minutely punctulate. Lower side of posterior femora with two punctures, very dilatate in middle and forming a strong obtuse projection; posterior tibiæ straight; four anterior tarsi with joints 2-4 dilatate and densely spongiose beneath, those of anterior tarsi very widely dilatate; posterior tarsi with joints 1-4 successively shorter; first not long, about one-fourth longer than second.

Length, 7; breadth, 2·5 mm.

A very distinct and quite isolated species among the Australian Harpalides known to me. I have placed it in the genus *Hypharpax* because the posterior femora have the lower side so strongly dilatate in the middle as to form a sudden obtuse protuberance, which might almost be called dentiform, and because the posterior tarsi have the first joint but little longer than the second. Its nearest allies seem to be the three Australian species that M. de Chaudoir left in the genus *Anisodactylus* (only because he could find no satisfactory features by which to separate them from that genus), but beyond a general resemblance it has little in common with any of them; its black color, dark legs, and the absence of a striole at the base of the second interstice, or a puncture towards the apex of the third, are decided characters distinguishing it from them. It breaks down some of the barriers separating *Anisodactylus rotundicollis*, Casteln., and its allies, from the genus *Hypharpax*: as *H. interioris*, Sl., breaks down some of those between *Phorticosomus* and *Hypharpax;* and is one of those species which help to show the artificiality of genera founded wholly on the sexual characters of one sex.

Hypharpax interioris, *n. sp.*

Oval, depressed; prothorax transverse, sides strongly rounded, base (2 mm.) a little wider than apex (1·8 mm.); elytra much wider than prothorax, third interstice with a lightly impressed puncture just behind beginning of apical declivity. Male with posterior femora not dentate on lower side. Brown, with bronzy tints on upper surface; femora, posterior trochanters, palpi and base of antennæ testaceous; tibiæ, tarsi, and apical part of antennæ a little infuscate; mandibles light brown, the apex black

Male. Head moderate, not large; eyes not prominent. Antennæ short. Prothorax lightly convex, transverse (1·9 x 2·7 mm.), widest about middle, strongly rounded on sides; base very little wider than apex; anterior margin lightly emarginate; base lightly rounded, truncate in middle; anterior angles wide, obtuse, not advanced; posterior angles obtusely rounded, not marked; border wide on sides, narrow and entire on base; lateral margin explanate; median line obsolete; lateral basal impressions wide and shallow. Elytra lightly convex, wide, oval (5 x 3·6 mm.), lightly rounded on sides; sinuosity of apical curve obsolete, though just perceptible at extremity of ninth interstice; striæ lightly impressed, first flexuous near base; interstices flat, second with a short, lightly impressed striole at base, third with a fine puncture on apical declivity, about level with extremity of fifth interstice, ninth punctate, the punctures not widely interrupted in middle. Mestasternum smooth, very finely punctulate on each side. Ventral segments with a few punctures, bearing long setæ scattered over their surface. Posterior femora compressed, dilatate in middle, but without any obvious projection on lower side, a row (more or less double) of not closely-placed punctures, bearing long setæ along outer margin of lower side; posterior tibiæ almost straight; four anterior tarsi with joints 2—4 dilatate (not very broadly) and densely spongiose below; posterior tarsi short, first joint hardly longer than second.

Length, 8; breadth, 3·6 mm.

This species leads off from the typical species of *Hypharpax* towards *Phorticosomus;* probably its nearest ally among described species is *H. Deyrollei*, Casteln., from which it may be distinguished by its wider and less convex shape, the prothorax more rounded on the sides, the different form of the elytral interstices (in *H. Deyrollei* the interstices become narrow and convex at their apex, and the fifth and sixth extend much nearer to the apex than in *H. interioris*), and by the position of the puncture of the third interstice, which is much nearer the apex in *H. interioris* than in *H. Deyrollei*. Note.—The prothorax, though not quite evenly rounded laterally, being a little more obliquely narrowed towards the base than towards the apex, is so much more strongly and evenly rounded on the sides than that of any other *Hypharpax* I have seen, as to make this a most obvious and noticeable feature of the species.

Besides the species dealt with above, the following Carabidæ were brought by Mr. Zietz from Lake Callabonna :—

Calosoma Schayeri, Erich.
Geoscaptus lævissimus, Chaud.
Euryscaphus obesus, Macl.

Philoscaphus Tepperi, Blkb.*
Clivina Frenchi, Sl. (ms.s.).†
" *Blackburni*, Sl. (ms.s.).
" *sp. ?* (aff. *C. obliquata*, Putz.).
" *sp. ?* (aff. *C. debilis*, Blkb.).
" *sp. ?* (aff. *C. dilutipes*, Putz.).
Bembidium jacksoniense, Guer.
Pogonus cardiotrachelus, Chaud.
Chlœnioidius herbaceus, Chaud.
Rhytisternus cyathoderus, Chaud.
Dicrochile Goryi, Boisd.
Platynus marginicollis, Macl.
Lebia benefica, Newm.
Dromius crudelis, Newm.
Trigonothops nigronotatus, Chaud.
Gigadema longipenne, Germ.
" *sulcatum*, Macl.
Diaphorus (Zuphiosoma) fulvus, Casteln.
Chlœnius australis, Dej.
" *læteviridis*, *Chaud.*
Oodes Waterhousei, Casteln.
Anisodactylus rotundicollis, Casteln.
Hypharpax vilis, Blkb.

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* The Rev. Thos. Blackburn has sent me specimens collected by Mr. Zietz, under the name of *Ph. Tepperi*, Blackb.; they are so close to *Ph. tuberculatus*, Macl., that I am unable to find characters by which to distinguish them from that species. The upper edge of the lateral groove of the elytra is interrupted a little before the middle in *Ph. tuberculatus*, though to a less degree than in the Callabonna specimens ; these, however, vary *inter se* in respect to the decidedness of the interruption. The tubercles of the disc of the elytra are less marked in the Callabonna specimens than in typical specimens of *Ph. tuberculatus*, but this is a character that varies in *Ph. tuberculatus*.

† These species of *Clivina* will be treated of in a revision of the Australian Clivinæ, on which I am now engaged.

Additional Plant-remains from the Leigh Creek Coal-field, Central Australia.

By R. Etheridge, Junr., Curator of the Australian Museum, Sydney.

[Read August 6, 1895.]

1. Introduction.

The plant-remains about to be described form part of a collection made by Mr. George Sweet, of Brunswick, Melbourne, during a late tour through the fossiliferous Mesozoic area of Central Australia, and were kindly lent to me by him for description.

The fossils are of great interest, as establishing the presence of at least eight specific forms, in addition to those already enumerated by me in Reports* published by the Government Geologist of South Australia (Mr. H. Y. L. Brown).

The three species already determined are the following :—

Thinnfeldia odontopteroides, *Morris.*
Macrotæniopteris wianamattæ, *Fiestm.* ?
Thinnfeldia media, *Ten. Woods.*

I presume that the present series forms a portion of that exhibited† to the Royal Society of South Australia on October 17th, 1893, by Prof. R. Tate, on Mr. Sweet's behalf, and which contained the following species :—

" Thinnfeldia odontopteroides, *Morris.*
" media, *Ten. Woods.*
Tæniopteris, two species.
Equisetum, "
Macrotæniopteris wianamattæ, *Fiestm.*
Trichomanides laxum, *Ten. Woods ?*
Otozamites, *n.sp.*"

The specimens submitted to me are not all sufficiently perfect for specific determination, but still are of great importance as showing the presence in the Leigh Creek deposit of unsuspected genera, and comprise :—

Equisetum, *sps.*
Tæniopteris (Oleandridium ?) fluctuans, *sp. nov.*
" [cf. T. (Oleandm.) tenuinervis, *Brauns*].
Anthrophyopsis ? *sp. ind.*

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* S. Australian Parl. Papers, 1891, No. 158, p. 10 ; *Ibid*, 1893, No. 158 Suppl., p. 8.

† Trans. R. Soc. S. Austr. for 1892-93 [1893], xvii., p. 355.

Thinnfeldia odontopteroides, *Morris.*
Alethopteris [cf. A. australis, *Morris*].
Frenelopsis, *sp. ind.*
Podozamites [cf. P. lanceolatus, *L.* and *H.*].

2. Description of the Plant-remains.

Equisetum, *sps.*

Obs.—There are two compressed fragments of *Equisetum*, probably distinct from one another. One is three and a half inches long by one inch wide, containing within the length two nodes, and portions of three internodes. The surface is delicately striate.

The other example is three inches long and three-sixteenths of an inch wide, with five nodes, and portions of six internodes. On the flattened surface there are six longitudinal grooves continuous throughout. The specimens are too imperfect to render comparisons with published species of any practical value.

Tæniopteris (Oleandridium ?) fluctuans, *sp. nov.* Pl. v., figs. 1-3.

Sp. Char.—Frond simple (so far as known), elongately lanceolate, thick, coriaceous, crumpled, lateral margins sinuous. Mid-rib thick, moderately wide, and possibly longitudinally striate; secondary veins fine, straight, two in the space of one and a half mm., passing from the mid-rib at a right angle, sparsely furcate, and when so generally on immediately leaving the mid-rib, very rarely in the middle of the wing.

Obs.—When in the perfect state this must have been a remarkably fine leaf. It is now eight inches long, and incomplete at either end. The lower portion exhibits only the mid-rib and fragments of one of the wings attached. The breadth of the full frond where preserved is one and a quarter inches. The general facies of the frond seems to point to *Oleandridium* rather than *Tæniopteris* proper, but we know nothing of the fructification of the plant. If an *Oleandridium* it is near *O. vittatum*, Brong.,* although Brongniart's figures do not show any fluctuation of the margins, nor crumpling of the surface. On the other hand, Fiestmantel's illustration† of the Indian variety of this species decidedly manifests a sinuosity to each margin, and the fronds are to some extent crumpled also.

The question arises, in how far is this crumpling a natural or superinduced character? If the former, it will stand as a good specific character, and is certainly the first Tæniopterid I have seen from Australian rocks with this peculiarity.

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* Hist. Vég. Foss., 1828, I., t. 82, f. 1-4.
† Pal. Indica (Gondwana Flora), 1876, II., pl. i. t. 1.

The proximal end is not clearly preserved, but there is some indication of a scar of attachment.

The secondary veins on the narrow wings at the base are well preserved, and appear to be wider apart than on the broader or upper portions. The furcation is also very distinct, and takes place at a slightly more distant point than on the latter. A subdivision of the secondary veins on the broader portions of the frond is not common, but one is shown at about the centre in fig. 3 ; this is, therefore, a second subdivison. A peculiar tertiary subdivision occasionally although rarely, takes place near the margin (fig. 3), and when so several veins in this condition are clustered together. The primary furcation is also peculiar in that it occurs in immediate contiguity to the mid-rib, almost assuming the appearance of two parallel veins issuing from the same initial point. That this is not the case, however, is shown by the secondary veins in the narrow basal portion of the frond.

Oleandridium vittatum, Feistm., differs from the South Australian fossil by its irregular furcation, and the secondary veins are often more than once furcate.

A gentle fluctuation of the margin is shown in Nathorst's figure* of *O. tenuinerve*, Brauns ; indeed, this irregularity of the frond edges is quoted by Schimper as one of the specific characters. The secondary nerves are said to be furcate at the base only. On the whole *O. tenuinerve* is the nearest approach to our form that I have been able to find, although probably distinct. As regards size, an Australian described species, *T. Carruthersi*, Ten. Woods, may be compared to *T. (Oleandridium ?) fluctuans*, the name I purpose applying to the present frond, judging by the large fragments of it that have been published by Feistmantel from South Africa.†

Tæniopteris, *sp. ind.* Pl. iv., fig. 1.

Sp. Char.—Frond linear spathulate, four to five inches long and five-eighths of an inch wide, probably petiolate ; margins entire, not fluctuating ; surface plain, not crumpled. Mid-rib very strong, one-sixteenth of an inch wide ; secondary veins briefly issuing from the mid-rib at an acute angle, then diverging at a much more obtuse one, and proceeding to the margins more or less horizontally, one in the space of half a millimetre, and apparently all simple.

Obs.—This frond is so like many Tæniopterids that it is rendered difficult of determination. The substance of the frond, except here and there, has been converted into coaly matter, so that the entire venation has not been preserved for inspection,

* Floran vid Bjuf, 1878, I., t. 10, f. 4 and 5.

† Geol. Pal. Verhältnisse Süd-Afrikas, 1889, I., t. 2, f. 6-10.

but wherever visible appears to be simple, and in no way furcate. If this be the case it will afford a good character for future identification.

The frond outline is similar to that of *Angiopteridium M'Clellandi*, O. and M.,* but the neuration, according to Oldham and Morris, is occasionally dichotomous. Feistmantel's additional figure† of the Indian plant quite bears out his predecessor's description. At the same time Zeiller has given a representation‡ of this fern in which the neuration is quite simple, as that from Leigh Creek is believed to be.

In the simplicity of its veins and general form of the frond the present one agrees very closely with the simple-margined varieties of *O. tenuinerve*, Brauns, even more closely than *O. fluctuans*, mihi, does. Both Nathorst's figure previously quoted and another given by Schenk§ as *O. tenuinerve* are equally like the present fossil, but it differs considerably from *O. lentriculiforme* lately described‖ by me from intercalated shale in the Hawkesbury Sandstone.

Anthrophyopsis ? *sp. ind.* Pl. iv., fig. 2.

Obs.—A large imperfect frond is in the collection that may possibly be referable to this genus. There is no trace of a mid-rib, but the elongated mesh-reticulation of the secondary veins described by Nathorst, the author of the genus, in his "Flora of Bjuf" are well displayed. In the absence of any contrary characters, I have no option but to provisionally refer the Leigh Creek plant to *Anthrophyopsis*.

Nathorst figures two species in the above work differing a good deal in the venation. In *A. crassinervis*¶ what may perhaps be called the proximal venation occasionally forms a large elongate mesh, but towards the margins this becomes much stronger and closer. In *A. Nilssoni*,** Nathorst, the mesh is of equal size throughout, but so far resembling the former that the reticulation is large. In his "Flora of Häganäs," Nathorst gives a more complete figure of *A. Nilssoni*, and describes a third species—*A. obovata*, but in neither of these is the base of attachment shown.

The frond, now before me, resembles a fish-tail in general outline and expands rapidly towards the distal end. The base of attachment is widely subauriculate, the sides of the frond then

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* Pal. Indica (Gondwana Flora), 1863, I., pt. 1, fascic. 5, t. 23.
† *Ibid.* 1877, pt. 2, p. 96, t. 46, f. 5 and 6.
‡ Ann. des Mines, 1882, Livr. Sept.-Oct., t. 10, f. 5.
§ Foss. Flora Grenzsch., 1868, Atlas, t. 25, f. 3 and 4.
‖ Records Geol. Survey, N.S. Wales, 1894, IV., pt. 2, p. 49.
¶ Floran vid Bjuf, 1878, I., t. 7, f. 3 and 4.
** Floran vid Bjuf, 1878, I., t. 7, f. 5.

narrowing and suddenly expanding. The outer or distal extremity of the frond is unknown. There is no mid-rib, the well-marked neuration radiating and following the outline of the frond. The veins are equal in size, some twice and others thrice dichotomous, certain of them again uniting at long intervals to form an exceedingly elongated hexagonal, or rarely polygonal, equal-sized mesh, more particularly in the basal third of the frond; they are slightly thickened immediately before dichotomization, and the branched or dichotomised vein then slightly bending. On the whole, allowing for the slightly radiate character, the veins may be said to be subparallel.

I do not think there can be any question of the remarkable shape of this frond, for although here and there the margins are not preserved, still there is sufficient remaining at other places, more particularly towards the base, to warrant the outline described above; furthermore, the curvature of the venation supports this. There is no sign of a petiole.

Fragments of fronds referred to *Anthrophyopsis* are not unknown from Mesozoic deposits other than those of Sweden. Feistmantel has figured* a supposed fragment from the Lower Gondwana formation of India, which has a neuration with very much the aspect of that of our plant, but perhaps the mesh formed by the reticulation of the veins is larger in the latter than the former. The same author has also described† a supposed example from the South African Karoo formation, but the mesh is much too small for that of the South Australian plant. Feistmantel seemed inclined to regard‡ *Anthrophyopsis* merely as a *Gangamopteris*, but in none of Nathorst's figures is there the peculiar "dissolved" mid-rib of the latter. If the present frond be an *Anthrophyopsis*, it is most nearly allied to *A. Nilssoni*. Whatever its nature may be, one point is certain, not only is it an addition to the Leigh Creek deposit, but also to the Mesozoic rocks of Australia generally.

It would be unnecessary to notice the genus *Ctenis*, as originally figured by Lindley & Hutton, were it not that both Schimper§ and Schenk‖ have referred *Tæniopteris asplenioides*, Ett., to *Ctenis*. This is a plant having a close resemblance to Nathorst's *Anthrophyopsis crassinervis*, Schimper remarking that the neuration recalls that of *Glossopteris*. However much Ettinghausen's species may resemble the present form of plant,

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* Pal. Indica (Gondwana Flora), 1881, III., pt. 3, t. 41*a*, fig. 5.
† Geol. Pal. Verhältnisse Süd-Afrikas, 1889, I., p. 67, t. 2, fig. 4.
‡ Pal. Indica, *loc. cit.*, p. 115.
§ Zittel's Traité Pal., pt. 2, Paléophytologie (French edit.), 1891, p. 131.
‖ Palæontographica, XVI., Heft 6, t. 25, fig. i.

Lindley & Hutton's type, *Ctenis falcata*, is exceedingly unlike both.

I shall await with much curiosity further discoveries at Leigh Creek, in the hope that they will solve the true systematic position of this curious frond.

Alethopteris, *sp. ind.* Pl. vi., figs. 1, 2.

Obs.—Fragment of a particularly well-marked fern, that certainly does not possess the typical characters of *Alethopteris australis*, Morris, as we know the latter in Eastern Australia. It is distinguished from this plant by the much shorter and more rapidly falcate pinnules, their upwardly directed set and closely adpressed position.

The pinnules are short, subfalcate, curved, upwardly directed, and touching; the margins are entire towards the apex, and the latter obtuse. The mid-rib in each pinnule is continuous almost to the apex, where it slightly evanesces; the secondary veins are from eight to twelve in each pinnule, and once furcate.

It is almost impossible to ascribe a name to a fragment of this description, but possibly the following comparisons may assist in its determination on the discovery of more perfect specimens. The nearest allies appear to be *A. australis*, Morris, *A. Rosserti*, Presl., and *A. Albertsi*, Schimper. Morris describes* the neuration of *A. australis* as bifurcate or dichotomous. McCoy, on the other hand, writes† as follows:—"The veins are much more commonly forked only once in the Australian plant, as I figure it, than with the second marginal branching, as given by Morris." In the present specimen the veins appear to be once furcate only on each pinnule. There is the possibility, therefore, that it may be only a variety of *A. australis*.

The resemblance is also strong between the Leigh Creek fragment and Zeiller's figure‡ of *A. Rosserti*, Presl., from the coal formation of Tonquin, except again in the neuration, which is twice furcate in the latter. Again, equally like is Schenk's figure§ of *A. Albertsi*, Schimper, from the Wealden beds of N.W. Germany. In this species the pinnules are of the same semi-falcate outline, and the secondary veins are once bifurcate, but, collectively, the pinnules do not present the same degree of regularity.

The pinnules lack the extremely acute and falcate outline of those of *A. whitbiensis*, L. & H.; neither are they as strictly spear-head-shaped as seen in *A. hastata*, Phill.,‖ nor elongate

* Strzelecki's Phys. Descrip. N.S. Wales, &c., 1845, p. 248, t. 7, f. 2*a*.
† Prod. Pal. Vict., 1875, Dec. II., p. 17.
‡ Ann. des Mines, 1882, Livr. Sept.-Oct., t. 10, f. 3, 3*a*.
§ Beitrage Flora der Vorwelt (*Palæontographica*), pt. 4, t. 6, f. 4.
‖ Geol. York., 1836, I., t. 8, f. 17.

and widely separated, like those of *A. ligata*, Phill.,* both of which are by some observers believed to be identical with *A. whitbiensis.*

The characteristic Indian fern, *A. indica*, O. & M.,† presents a totally different appearance to our fossil, from its long and more or less acute pinnules. Another Indian plant, *A. (Phegopteris ?) phegopteroides*, Feistm.,‡ on the other hand, in the size, shape, and contiguity of the pinnules, is very like the fragment from Leigh Creek, but the venation is quite simple.

There is no trace of fructification, and it is therefore better not to enter into the question of its generic identity, beyond referring the species to *Alethopteris.*

Thinnfeldia odontopteroides, *Morris.*

Obs.—A few pinnules, oval to sub-reniform in outline represent this species.

Podozamites, *sp. ind.*

Obs.—A single leaf of this well-known genus is in the collection, three and a-half inches long, but still imperfect. The base of attachment is shown, and about twelve parallel simple veins, extending the whole length of the leaf, with the interspaces delicately striate. It is probably allied to, and may even be identical with, the protean species *Podozamites lanceolatus.*

Frenelopsis (?) *sp. ind.* Pl. vi., figs. 3-6.

Obs.—These fragmentary bifurcating branches remind one very strongly in general habit of some of the Mesozoic Coniferæ, such as *Glyptostrobus*, *Athrotaxopsis*, and particularly *Frenelopsis*, but there is an entire absence of scales on our specimen, and, at first sight of stem, articulation also.

The first specimen consists of a short stem, giving off two branches near its fractured base, then bifurcating, each bifurcation again dividing, one twice, and the other once, near the top of the specimen. The main branch bears fine longitudinal, apparently inosculating, striæ, but the subsidiary branches are pitted. At the bifurcation two other branches appear to be given off, but the connection is not altogether clear.

The counterpart exhibits further interesting details, for the impression, here and there, when the carbonised vegetable matter has been removed, shows faint transverse lines, representing, I believe, articulations both on the main and subsidiary branches.

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* Geol. York., 1836, I., t. 8, f. 14.
† Pal. Indica (Gondwana Flora), 1863, I., pt. 1, Fas. 5, t. 27.
‡ *Ibid*, 1881, III., pt. 3, p. 81, t. 18*a*, f. 1 *a* and *b*.

It is on account of the method of branching, and the presence of these articulations, that I think the specimen may *possibly* be a form of *Frenelopsis*. In such a case, it is much more like some of the American species than the European, for instance, *F. ramosissima*, Fontaine,* of the Potomac Younger Mesozoic Flora. Touching the disappearance, or faint preservation, of the articulations, it would appear from Fontaine's remarks and illustrations that when the epidermis is lost, and the plant decorticated, the articulating scars become more or less invisible also, and it is in this condition that I take our specimen to be.

The second specimen appears to be the terminal portion of a branch.

EXPLANATION OF THE FIGURES.

Plate IV.

Fig.

1. Tæniopteris (Oleandridium ?), *sp. ind.* A Tæniopterid frond, possibly referable to *Oleandridium* and near *O. tenuinerve*, Brauns.
2. Anthrophyopsis ? *sp. ind.* An imperfect frond, with a fish-tail proximal end, and a Glossopterid net venation, but no trace of a mid-rib.

Plate V.

1. *Tæniopteris* (*Oleandridium ?*) *fluctuans*, Eth. fil. Frond showing crumpled surface and thick mid-rib.
2. Proximal portion twice enlarged, showing the widely separated secondary veins furcate near the mid-rib.
3. Part of the upper portion of the frond much enlarged, showing the secondary veins furcate near the centre, or furcate in clusters near the margin.

Plate VI.

1. Alethopteris, *sp. ind.* Portion of a pinna, showing short sub-falcate, curved, upwardly-directed, and touching segments.
2. Four of the segments, twice enlarged, exhibiting the once furcate secondary veins.
3. Frenelopsis (?), *sp. ind.* Portion of a stem showing the method of branching.
4. The reverse of fig. 3.
5. The lower portion of fig. 3, twice enlarged, showing the inosculating striæ on the main stem, and pitted surface of the branches.
6. A specimen believed to be the terminal branches of this plant.

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* Mon. U.S. (Powell's) Geol. Survey, 1889, XV., t. 95, 96, 99, &c.

Notes on Victorian and Other Blattariæ and Descriptions of New Species.

By J. G. O. Tepper, F.L.S., &c.

[Read August 6, 1895.]

Some time ago a collection of Victorian cock-roaches from the National Museum, Melbourne, was placed in my hands for determination; it comprised 39 species in 18 genera. Among these were a considerable proportion, viz., 13 species, which I was unable, to my surprise, to refer to any of those hitherto published, and therefore presumably new, while two new genera had to be established. Some of these are very rare, as the very able collector, Mr. Jas. A. Kershaw, assures me, and have only been found in one or a few individuals hitherto. The material being scanty, mostly in a form not permitting the study of the wings, and sometimes defective, the characterization is not quite so definite as desirable; but as the respective species differ very much in other details it was considered advisable to attach names—subject, however, to possible future corrections.

Through the study of some of the above new material I have also been induced to transfer my genus *Temnelytra* from the Phyllodromidæ to the Periplanetidæ on account of the distinctly valvular form of the inferior sexual lamina of the female, and to place it after the genus (or subgenus) Drymaplaneta, mihi, from which it differs in the elytra being much more developed (although not nearly so much as in the winged forms of Periplaneta) and in other details.

Besides the Victorian specimens a small number of others had accumulated in the Museum since my last paper, comprising new forms, or described ones from new localities, or such of which only one sex was known. Several of these, coming from Queensland and Western Australia, were kindly contributed by my friend, C. French, Esq., F.L.S.; the remainder hail from various parts of South Australia. Among these, seven species were recognised as new, and an eighth as also represented in the Victorian collection. The rare types of the latter are in the National Museum, Melbourne, when unique; the remainder also represented in the S.A. Museum.

It may be remarked that, so far as my Australian researches hitherto extend, the Blattariæ exceed every other orthopterous group in number of species and genera. As they are among the

oldest known types of insects, this fact seems to offer additional testimony of the great antiquity of the fauna of this continent.

The works consulted are those of Messrs. Brunner de Wattenwyl, Henry de Saussure, Burmeister, and Stăl.

The species belonging to the Victorian collection have the numbers attached under which they were submitted ; the others are unnumbered and marked by an asterisk preceding the name.

ECTOBIDÆ.

ECTOBIA APICIFERA *(Walk.), Tepper.* No. 24.

Kewell, N.W. Victoria.

ECTOBIA MINIMA, *sp. nov.* No. 25.

Male. Body shining, pale beneath. Head pale tawny, a broad brownish band in front; eyes black ; antennæ brownish. Pronotum subtransverse, a pale whitish median stripe as wide as the space between the eyes and of equal width throughout, on each side bordered by a piceous stripe narrow at the apex, much wider behind, lateral margins broadly pellucid. Elytra much exceeding the abdomen, lateral and sutural margins broadly pale, whitish, medial space piceous. Legs (very long), pectus and base of abdomen pale tawny, spines partly blackish ; apical part of abdomen deep black. Cerci pale.

	Male.
Length of body	4·3 mm.
Length of elytra	4·3 "
Length of pronotum	1·3 "
Width of pronotum	2 "

Hab.—Mordialloc, Victoria. (Nat. Mus., Melbourne.)

The smallest species known to me.

ECTOBIA SUBLUCIDA, *sp. n.* No. 40.

Female. Body piceous, banded paler. Head brownish, eyes pale, a dark band between the latter interrupted in the middle, antennæ ferruginous. Pronotum semicircular, angles slightly rounded, lateral margins broadly brownish, disk piceous, with a brownish triangular spot adjoining the straight hind margin. Elytra piceous, lateral margins dull tawny, shorter than abdomen, apex rounded (radial and ulnar veins not separate at base). Legs pale brownish. Abdomen piceous, banded or spotted paler.

	Female.
Length of body	6·5 mm.
Length of elytra	4·6 "
Length of pronotum	1 3 "
Width of pronotum	2·5 "

Hab.—Chiltern, Victoria. (Nat. Mus., Melbourne.)

Resembling *E. lucida*, Br.; it differs from it in the parallel branches of the ulnar veins being all obliquely directed to sutural margin instead of to the apex, the pale eyes, the pale spot of the pronotum, and the smaller size.

ECTOBIA (?) MARGARITA, *sp. n.* No. 46.

Male. Pearly grey, dotted with pale brown. Face blackish, a pale band between the black eyes; vertex finely striped pale and dark; antennæ brownish. Pronotum suborbicular, pale translucent; disk impressed, laterally dotted brownish, hind margin rounded. Elytra long, narrow, of pearly lustre, longitudinal vein and the oblique parallel branches much raised, discal area dotted brown. Wings pellucid, highly iridescent. Legs very slender, banded or dotted brown. Abdomen beneath black towards apex.

	Male.
Length of body	6 mm.
Length of elytra	6·7 "
Length of pronotum	1·2 "
Width of pronotum	1·5 "

Hab.—Grampians, Victoria. (Nat. Mus., Melb.)

The slender form, structure of elytra, &c., render this form easily recognisable.

PHYLLODROMIDÆ.

LOBOPTERA CIRCUMCINCTA, *Tepper*. No. 22.

Dandenong Ranges, Victoria. Male and female. Locality new.

TEMNOPTERYX FERRUGINEA, *sp. n.* No. 7.

Female. Pale ferruginous above, legs and underside tawny. Head pale, antennæ brown, base pale. Pronotum elliptic, reddish yellow, pellucid, hind margin rather convex. Elytra attaining to penultimate segment of abdomen, uniformly ferruginous, anal vein impressed, recurved. Wings shorter than elytra. Claws with plantula and arolia distinct. Abdominal segments banded or clouded with brown, angles very little produced. Supra-anal lamina transverse, trigonal, apex rectangular. Cerci long, acuminate. Subgenital lamina very large, cucullate, entire.

	Female.
Length of body	15 mm.
Length of elytra	10·5 "
Length of pronotum	5 "
Width of pronotum	6·6 "

Hab.—Fernshaw, Victoria. (Nat. Mus., Melbourne.)

This species, with *T. deropeltiformis*, Br., might be included into a separate subgenus distinguished by the greater length of

the elytra and the presence of wings at least in the male. From *Blatta* and *Periplaneta*, although very similar in form, they are separated by the entire subgenital lamina of the female, and from the genus *Phyllodromia* by the abbreviated elytra, &c.

*Paratemnopteryx australis, *Sauss.; id.*, Tepper, Trans. Roy. Soc., S. Aust., 1894, p. 170.

A female captured by me in my house at Norwood is assigned to this species, and agrees in all respects with the original description. A male (found in the Public Library, Adelaide) with perfect wings appears to belong also here. They are easily distinguished from the common "black beetles" *(Peripl. orientalis)*, which they resemble in color, by the subgenital lamina of the female not being valvular as in the latter, &c. The male being still undescribed, the following description is appended.

Male. Elytra and wings perfect—(Female. Elytra very much abbreviated, wings rudimentary or none)—exceeding the body, dull brown. Head shining, vertex dark red, face black; areoles of antennæ and the labrum yellowish, antennæ brown and white annulated. Pronotum shining, disk dark reddish, surrounded by a zone of dark piceous, which is widest behind; lateral margin deflexed, narrowly bordered with red, rotundate; hindmargin nearly straight, angles rounded. Elytra exceeding abdomen by about one-fifth, margins subparallel, apex rounded; veins much raised, branches of ulnary veins parallel, emitted towards apical border; anal vein distinctly recurved; mediastinal area red near base, remainder to first branch blackish; remainder of elytra dull dark brown. Wings as long as elytra, smoky to blackish. Pectus and legs tawny. Tarsi pale. Supra-anal lamina depressed, rather broadly trigonal, apex truncate, slightly concave, apical margin narrowly white. Cerci long, lanceolate, flat, densely ciliate, black above, beneath brown, concave; apex acute. Subgenital lamina short, broad; hindmargin rotundate, entire, black; disk red.

	Male.	Female.
Length of body	15·5 mm.	16 mm.
Length of elytra	15 "	6 "
Length of pronotum ...	5 "	5 "
Width of pronotum ...	7 "	7 "

Hab.—Adelaide. (S.A. Museum.)

The following species differs from the above in its elytra being much longer with the female, the supra-anal lamina being much narrower and ovate instead of trigonal, besides being much smaller. With the male the pronotum is flatter and less rounded, the supra-anal lamina narrower and distinctly emarginate. Neither of the two species exhibits a trace of plantula or arolia.

PARATEMNOPTERYX BLATTOIDES, *sp. n.* Nos. 27, 33, 47 (larva).

Resembling *Temnopteryx deropeltiformis*, Br. Dark brown, concolorous above, underside and legs reddish. Head wholly covered. Pronotum shining, subelliptic, truncate in front, disk rather flat to convex, slightly excavated behind in the middle and with a single impressed dot on each side in front; hindmargin slightly rounded. Elytra of male exceeding the abdomen; of female abbreviate, attaining from one half to two-thirds of the abdomen; in both sexes the anal vein subflexuose, recurved; apex rotundate. Wings of male nearly as long as elytra, of female rudimentary. Supra-anal lamina narrowly trigonal, of female the lateral margin reflexed, disk tectiform. Cerci long, slender. Subgenital lamina arcuate, apex truncate, hindmargin subcrenulate.

	Male.	Female.
Length of body	13 mm.	13–15 mm.
Length of elytra	14 "	8– 9 "
Length of pronotum ...	4 "	4– 4·7 "
Width of pronotum ...	6 "	6– 6·5 "

Hab.—Narre Warren and "near" Melbourne. (National Museum, Melbourne.)

The females resemble the figure of Saussure's *Blatta Conloniana* (*Temn. pennsylvanica*, Deg.) very much in outline, but differ much in size and detail. A female specimen from "Victoria" was also previously presented by C. French, F.L.S., and is in the collection of the S.A. Museum.

*PHYLLODROMIA GERMANICA, *L.; id.*, Tepper, Trans. Roy. Soc., S.A., 1893, p. 41.

In the above paper it was mentioned that the reported occurrence of this European species in Australia required confirmation. In February last several specimens were received from Dr. Stirling, F.R.S., and Mr. Geo. Bednall respectively. These were captured in dwellings in the city of Adelaide, and agree perfectly with the descriptions. They were no doubt introduced by means of the shipping.

PHYLLODROMIA LITURATA, *sp. n.* No. 42.

Dark brownish. Face pale, with a black figure like the Greek capital ypsilon ϒ; vertex black, with a pale zigzag band between the eyes; antennæ setaceous, very finely ciliate, base pale, else dark brown. Pronotum transverse, much rounded in front, slightly convex behind; lateral and foremargin broadly, hindmargin narrowly, whitish; disk black, with a pale figure like some oriental letter or ornamental device, and quite symmetrical. Elytra long, costal margin broadly whitish; inframedial vein

nearly straight, much branched, discal area blackish brown. Legs pale tawny; coxæ with a few dark spots and fine black marginal lines; femora lined black below and with a dark spot near the apex; tibiæ blackish at the apex. Abdomen black or dark brown in the disk above and below, margins broadly pale, dotted black. Supra-anal lamina? Cerci banded pale and dark. Subgenital lamina large (in the specimen before me quite unsymmetrical, the left side much longer than the right), apex rounded, hindmargin flexuose, black, middle whitish. Style on left side short, slender, placed marginally near angle, on right side obsolete (bisexual?).

	Male.
Length of body	11 mm.
Length of elytra	11 "
Length of pronotum	2·3 "
Width of pronotum	4 "

Hab.—Western District, Victoria. (Nat. Mus., Melb.)

I cannot find any description fitting this well-marked insect.

APOLYTA PALLIDA, mihi. No. 16.

Hab.—Gippsland, Victoria. Locality new.

APOLYTA DECORATA, mihi. Nos. 11, 14.

Two larvæ of different ages and localities. No differences are perceptible between the typical South Australian and the Victorian specimens.

Hab.—W. Victoria (11); Tatura, Victoria (14). Localities new.

APOLYTA PELLUCIDA, *Brunner*. No. 18.

Hab.—Dandenong, Victoria. Locality new.

Besides this and another specimen presented by Mr. French a third from North Queensland reached the Museum collection. Although all these agree well with the original description, yet differ in minor details. Thus Mr. French's specimen has the black disk of the pronotum longitudinally divided by a reddish stripe, and the black apex of the elytra very small. The Dandenong specimen has the black undivided area of the disk of the pronotum distinctly quadrangular, with the hindangles truncate, and the black patch at the apex of the elytra much larger; while in the Queensland specimen the black area of the pronotum is much reduced in size and hexagonal in shape, and the black color occupies not only about one-fifth of the elytra, but also borders the whole of the sutural margins. All the three differ also in size, Mr. French's specimen being the largest, and that from Queensland the smallest. The ventral segments of the abdomen, except the two last, and the lateral margins above and beneath are bordered white.

Apolyta pallescens, *sp. n.* No. 20, and perhaps 16.

Pale tawny; abdomen brown to black. Face with a black "T"-like figure, a round brown spot between the antennæ, surrounded by a pale border; antennæ pale, hirsute, very slender. Pronotum rounded in front, slightly convex behind, disk with a short brown oblique stripe on each side, united behind by a narrow dark band. Elytra oval, concolorous, costal margin broadly pellucid, disk pale tawny. Legs and pectus pale. Abdomen black above, dark brown beneath, lateral margin broadly pale; also the cerci. Supra-anal lamina trigonal, apex pale, narrowly emarginate.

Length of body	11 mm.
Length of elytra	8·5 "
Length of pronotum	2·7–3 "
Width of pronotum	4·5 "

Hab.—Narre Warren, Victoria. (Nat. Mus., Melbourne.)

This species differs from *A. vestita* by the marking of the face and the pale color of legs, antennæ, &c.; from *A. pallida* in the outline of the pronotum, the marking of the face, and the veins of the elytra not being pale. It and the following species may require a separate subgenus.

Apolyta marginata, *sp. nov.* No. 29 (male), 44 (female).

Pale tawny to blackish. Antennæ dark, except basal joints. Pronotum shining, margins whitish all round, narrow in front and behind, broad laterally, dark area of disk divided by a pale median stripe into two oval or oblong spots. Elytra normal, costal margin broad, whitish; radial vein narrowly black at the base, remainder of veins and veinlets whitish. Legs tawny. Abdomen above banded indistinctly darker, beneath yellowish (male) or blackish (female). Supra-anal lamina triangular, apex acute. Subgenital lamina subcucullate, oval, apex slightly emarginate (male), or keeled and obtuse (female).

	Male.	Female.
Length of body	9 mm.	8·5 mm.
Length of elytra	8 "	8 "
Length of pronotum ...	2·2 "	2·5 "
Width of pronotum ...	3·2 "	3 "

Hab.—Gippsland, Victoria. (Nat. Mus., Melbourne.)

I am not quite sure whether the two specimens represent the two sexes of the same species, but they are very similar. Type of *A. vestita*, Br., apparently.

*Apolyta bicolor, *sp. n.*

Male. Vertex of head and the disk of the pronotum pale testaceous. Abdomen, legs, and pectus black; also the antennæ.

Lateral and posterior margin of pronotum pale, pellucid. Elytra narrow, costal and basal part of radial area yellow, anal area (except small part of base) and the whole sutural margin black. Lateral margin of abdomen narrowly pale; cerci pale. Subgenital lamina elongate, apex truncate.

Length of body ...	...	...	...	7 mm.
Length of elytra	...	...	...	7·5 "
Length of pronotum	...	...	...	2.2 "
Width of pronotum	...	...	...	2·7 "

Hab.—Cape York, North Queensland. (S.A. Mus.)

This species belongs to the type of *A. pellucida*. The wings are pellucid, costal margin yellow, apex and anal area (partly) blackish. The specific name refers to the characteristic marking of the elytra.

*Thyrsocera (?) australis, *sp. n.*

Female. Blackish above, pale beneath, shining. Head black, concolorous. Pronotum subquadrangular, a little wider behind, angles rounded; margins (all round) white, widest laterally, very narrow behind; disk black; fore and hindmargins convex. Elytra gradually attenuated towards apex along sutural margin, black in reflected, brown by transmitted light, foremargin white, scutellum black. Legs and pectus pale. Base of coxæ and foremargin of femora black, spines of tibiæ brownish. Abdomen pale dirty grey, margin whitish, ventral segments black, margin broadly whitish and divided by a brown line. Supra-anal lamina truncate. Cerci long, lanceolate, flat, above pale, with a marginal row of dark dots; below banded black and white. Subgenital lamina large, rotundate, entire, laterally broadly white.

Length of body ...	...	...	...	9 mm.
Length of elytra	...	...	...	9 "
Length of pronotum	...	...	...	2 "
Width of pronotum	...	...	...	3 "

Hab.—North Queensland. (S.A. Mus.)

The genus has not been recorded hitherto from Australia (except by Walker, whose determinations are too indefinite for identification in most cases), but being widely distributed (India, America) its occurrence is not unexpected. The described specimen differs, however, from the typical species in having the middle vein scarcely angulated. The left elytron crosses the right at rest and covers the latter completely at the apex, the line of demarcations being deeply impressed and extending obliquely from near the base of the lower elytron to near the apex, indenting all the veins. This appears to me to be rather uncommon. The wings also seem to exhibit some differences; the border is

narrowly white in front, then much wider blackish, the large remainder translucent and smoky.

ISCHNOPTERA AUSTRALIS, *Sauss.* (?). No. 8.

The two specimens fit fairly well Saussure's description—"Pale ferruginous, antennæ brownish. Pronotum discoidal, narrower in front, hindmargin (sub-?) truncate, lateral margin pellucid, deflexed; disk opaque, with two slight (oblique) sulci. Elytra very long, narrow, margin reflexed, veins much raised, transverse veinlets perspicuous," with the following variations—Color pale tawny, disk of pronotum yellowish, pectus and legs greyish tawny, abdomen brownish. Supra-anal lamina of male triangular, apex deflexed, of female truncate. Subgenital lamina of male acute, of female rotundate. Cerci long, acute.

	Male.	Female.
Length of body	17 mm.	15·5 mm.
Length of elytra	22 "	18 "
Length of pronotum ...	4 "	4 "
Width of pronotum ...	6 "	6 "

Hab.— Dandenong, Victoria. (Nat. Mus., Melbourne).

The female has the left elytron aborted, it being less than half the length of the right, else quite perfect.

ISCHNOPTERA ANNULATA, mihi. No. 4.

Hab.—Melbourne, Victoria. Locality new. (Nat. Mus., Melbourne).

ISCHNOPTERA LONGIUSCULA (*Walk.*), *Tepp.* Trans. Roy. Soc. S. Aust., 1893, p. 51. No. 21 pars.

The male specimen before me agrees with Walker's description that I do not care to separate it (although larger), but append a description.

Pale tawny. Head brownish, eyes a little darker; antennæ pale brownish. Pronotum transversely oval, margins and median space pale, disk with dark spots and other markings. Elytra with ulnar vein much branched, rami directed obliquely towards hind margin; ulnar vein *recurved* at apex (in *Phyllodromia* directed forwards). Legs concolorous. Abdomen with dark margin. Subgenital lamina subtrigonal, apex subacuminate. Styles minute. Cerci dark brown.

Length of body...	12 mm.
Length of elytra	12 "
Length of pronotum	2·2 "
Width of pronotum	3 "

Hab.—Near Melbourne. Locality new. (Nat. Mus., Melb.).

ISCHNOPTERA CONTRARIA, *Tepper*. No. 21 pars.

Hab.—Near Melbourne, Victoria. Locality new. (Nat. Museum, Melb.).

ISCHNOPTERA BRUNNEONIGRA, sp. n. No. 19.

Female. Brown above, almost wholly black beneath. Head black, vertex sometimes paler; antennæ brown, base black, first joint very large, first three joints shining, remainder dull, ciliate. Pronotum suborbicular, black, disk sometimes paler (reddish brown or varied with paler patches), margins narrowly pale. Elytra brown, anal vein recurved, narrow. Pectus, coxæ, and femora black or varied paler, tibiæ brown, tarsi brown or testaceous. Abdomen dark brown, margins broadly black. (Supra-anal lamina ?) Cerci black. Subgenital lamina large, entire, hindmargin elliptic.

Length of body...	...	...	...	10·5 mm.
Length of elytra	...	...	...	12 "
Length of pronotum	...	...	...	3·2 "
Width of pronotum	...	...	...	4 "

Hab.—Fernshaw, Victoria. (Nat. Mus. Melb.).

The species is remarkable for its dark color. The egg-case of one is protruded to some extent, but incomplete.

*ISCHNOPTERA, *sp. nov.*

Pale testaceous, head black. Pronotum brownish, with rather deep elongate and divergent impressions on each side of the raised midline extending close to the hindmargin; lateral margin and costæ of elytra pale, pellucid. Legs and underside tawny.

Length of body	...	...	...	8·5 mm.
Length of elytra	...	...	...	10 "
Length of pronotum	...	...	...	2 "
Width of pronotum	...	...	...	3 "

Hab.—Eucla, W. Australia (collected by Mr. Unbehaun, jun.).

More material is desired before attaching a name.

EPILAMPRIDÆ.

WODONGIA, *gen. n.*

Oblong, convex. Elytra *convex, shining, shorter than the wings*, apex broadly rounded; *principal veins almost obsolete;* costal and apical branches slightly raised; anal vein subsemicircular, impressed. Wings slightly exceeding the abdomen, anterior radial vein much and furcately branched towards the foremargin, posterior radial vein *with three parallel branches* behind, third only forked near apex; dividing vein unbranched, space between it and the anal vein unequal in width, veinless,

triangularly divided towards apex. Supra-anal lamina of female elongated, subtectiform, slightly tapering, apex truncate. Cerci slightly exceeding the lamina. Valvules acutely triangular.

The genus approximates *Paraphoraspis*, and may be placed before it, on account of the veins of the elytra not being so much obliterated. The insect differs in the venation of elytra and wings, also in their form and that of the anal appendages, from all others as far as known to me, and is easily recognisable by the promiscuous lunate spot of the pronotum and the peculiar shape and color of the elytra.

WODONGIA LUNATA, *sp. nov.* No. 30.

Female. Pale tawny. Head pale; a black band between the eyes; antennæ brownish at base, blackish beyond the middle, much longer than the body, filiform, ciliate. Pronotum smooth, shining, margin scarcely reflexed; disk with *a large lunate black spot* remote from foremargin, slightly indented in the middle anteriorly, sinuate behind, middle produced as an acuminate stripe to the hindmargin; latter subrotundate, narrowly bordered with brown in the middle. Elytra subcorneous, costal margin pale, widest at the base, thence gradually attenuated, not attaining the apex; discal area reddish brown, concolorous; anal vein impressed, curving regularly and meeting the hindmargin at right angles. Supra-anal lamina brown, margins and midline paler. Cerci lanceolate, acute, deplanate. Valvules and preceding segment brown.

Length of body	...	...	...	19 mm.
Length of elytra	...	...	...	13·5 "
Length of wings	...	...	...	15 "
Length of pronotum	...	...	...	5 "
Width of pronotum	...	...	...	8 "

Hab.—Wodonga, Victoria. (Nat. Mus., Melbourne.)

EPILAMPRA GRACILIS, *Brunner* (ZETOBORA GRANICOLLIS, *Sauss.*). No. 5.

Hab.—Near Melbourne, Victoria.

EPILAMPRA NOTABILIS, *Walk.* No. 43. Melbourne.

EPILAMPRA PROPRIA, *Walk.* No. 32. Victoria, mallee scrub, West District.

EPILAMPRA INQUINITA, *Stål.* No. 28. Gippsland. New locality.

EPILAMPRA (RHICNODA, *Br.?*) PERPLEXA, *sp. n.* No. 34.

Male. Greyish tawny. Face with a brown longitudinal stripe, vertex (much wider than the basal joint of the antennæ) with three black lines. Pronotum transverse, anteriorly cucul-

late, lateral margin broad, reflexed; hindmargin depressed, sinuate, middle obtusangularly produced, disk *crowded with black, impressed dots.* Elytra flat, finely dotted, veins dark towards base; anal vein gradually and much recurved. Metatarsus externally with a few spinelets, internally crowdedly spinose; pulvilli small, apical. Abdomen much depressed, convex beneath, clouded blackish in the disk, laterally with dark dots. Subgenital lamina transverse, rhomboidal. Cerci pale, rather short, acute.

Length of body ...	...	...	...	26 mm.
Length of elytra	...	...	...	26 "
Length of pronotum	...	..	...	5 "
Width of pronotum	...	...	...	9·5 "

Hab.—Western districts of Victoria. (Nat. Mus., Melb.)

In general aspect the insect resembles very much Brunner's figure of his genus *Rhicnoda* (Rev. Orth., 1893, pl. i., fig. 11*b*), but is larger and the pronotum is crowdedly impressed punctate, a character otherwise attached to the American Phoraspinæ. From these it is, however, separated by all the remaining characteristics. Unlike the genuine *Epilampra*, the hindmargin of the pronotum is destitute of raised striæ. Until more material is available and the wingless (?) female discovered its place must remain uncertain.

GEOSCAPHEUSIDÆ.

GEOSCAPHEUS ROBUSTUS, *Tepper.* No. 36. Murray River.

As pointed out by Mons. H. de Saussure (*in litteris*), these insects have most affinity with the Panesthidæ, and are removed to their vicinity.

PERIPLANETIDÆ.

*POLYZOSTERIA VIRIDICOLOR, *Tepper*, Trans. Roy. Soc., S.A., 1893, p. 73.

Hab.—Beltana. Locality new.

A female with egg-case attached and alive was received through Mr. T. Bee in February last. The egg-case is dark brown, nearly smooth, dull colored, and bean shaped, measuring 19 x 7 x 8 mm. The posterior part is suddenly cut off, the anterior end more acute. The crest is about 1 mm. in height, straight, and shows 27 small but distinct teeth, besides two or three merely indicated, the case containing therefore about 30 ova. This is the first case seen and described.

POLYZOSTERIA OCULATA, *Tepper*, ibid, p. 75. No. 13.

Grampian Range, Victoria. Locality new.

Polyzosteria nobilis, *Brunner*. No. 31.

Hab.—Grampian Range, Victoria. Locality new. Also a specimen from Yorketown (legit Mr. A. Jung), which varies slightly in the legs of the male being mostly metallic bluish black, coxæ and underside pale yellow, banded metallic greenish blue.

Polyzosteria Frenchii, *Tepper*, ibid, 1894, p. 178. No. 12.

Hab.—Wodonga, Victoria. Locality new.

*Polyzosteria subreflexa, *sp. nov.*

Male. Resembling *P. reflexa*, Br., in form, but is smaller and *not scabrous*. Head dark greenish bronze, mouth parts pale; antennæ with first joint dark, second joint pale, remainder reddish brown. Pronotum broadly elliptical, lateral and foremargin subacutely reflexed, externally dusky yellow, upper edge reddish; disk not verrucose, with a flat, raised figure like an hourglass in the middle, and various excavations on each side, space near margin crowdedly impressed punctate, remainder with minute impressed dots, otherwise smooth and shining; hindmargin slightly concave, tuberculate, angles acutely produced. Meso- and metanotum similar, hindmargins smooth. Legs similar to those of *P. reflexa*. Abdomen concolorous, finely but indistinctly rugulose, lateral margins narrowly reflexed, rectangular, last two segments with angles produced; underside dark reddish piceous. Supra-anal lamina of male very short, transverse, hindmargin truncate, entire, narrowly and angularly deflexed. Cerci extremely short, yellow. Subgenital lamina trapezoidal, entire, hindmargin slightly convev, dark red. Styles as long or longer than cerci, red.

Length of body ...	...	22 mm.
Length of pronotum	...	7 "
Width of pronotum	...	11·5 "

Hab.—Ooldea. S.A. Museum (legit Prof. R. Tate).

The species is unlike any other, except *P. reflexa*, from which it is easily distinguished by its smooth surface and the totally different form of the anal lamina.

Platyzosteria melanaria, *Erichs.* No. 23.

Hab.—Western districts of Victoria. Locality new.

Platyzosteria atrata, *Erichson.* No. 39.

Hab.—Melbourne, Victoria. Locality new.

The specimen before me appears to agree perfectly with the short description published, except that the hind tibiæ are wholly red and the middle ones to about one-half, instead of only at the apex. The abdomen beneath is red in the middle, the supra-anal

lamina of the male rounded behind, and narrowly and angularly emarginate, the cerci broadly lanceolate, apex red; the subgenital lamina is short, truncate, and slightly emarginate, the styles rather long and acute. Length of body, 20 mm.; of pronotum, 5 mm. x 9 mm.

PLATYZOSTERIA BIFIDA, *Sauss.* No. 2, pars.

The female specimen received agrees so well with Mons. H. de Saussure's description of the male (Mel. Orth. II., p. 110; fig. 3) in all essential parts, that I have little doubt of the correctness of the mating, and append the supplementary description.

Female. Blackish chestnut, lateral margin of pro-, meso-, and metanotum dark red, disk smooth, shining, with very few minute impressed dots above and beneath. Head blackish, labrum and border of eyes red, ocellar spots and areoles of antennæ tawny; antennæ brown, base blackish. Pronotum with a slightly raised scutcheon-like figure in the disk with three rather prominent crenulations on each side anteriorly. Meso- and metanotum somewhat similar. Abdomen with hind margins of segments smooth, finely ciliate, angles acutely produced; underside similar, middle reddish. Coxæ black, external margins orange. Tarsi reddish to ferruginous. Supra-anal lamina subovate, emarginate, laterally serrate. Cerci short, apex pale. Subgenital valvules rather small, sutural part of apex incrassated.

Length of body	29 mm.
Length of pronotum	7 "
Width of pronotum	11 "

Hab.—Narre Warren, Victoria. Nat. Mus., Melb.

Walker's *P. tarsalis* appears to be somewhat similar, but is described as "sides minutely tuberculate, abdominal segments laterally tuberculate and segments 6 and 7 entirely so"—which is not the case in the above.

PLATYZOSTERIA EXASPERA, *Tepper*, l.c. 1894, p. 182. Nos. 2 (pars), 15.

Hab.—Near Melbourne (2), Berwick, Victoria. Locality new.

There were a pair from one place and a male from the other, the female with an egg-case attached. All agree well with the original types, notably in the sculpture of the surface, which affords a good criterion in allied forms.

*PLATYZOSTERIA COOLGARDIENSIS, *sp. n.*

Male. Resembling *P. latizona*, m., but larger and much broader in proportion. Yellow, banded with black, nearly smooth, moderately shining. Head testaceous, partly free. Pronotum yellow, shaded reddish laterally, with some raised black,

oblong spots around and adjoining the dark area; hindmargin rectangular, straight, angles slightly rounded. Meso- and metanotum similar, dark disk semicircular, hindmargins straight, angles slightly produced, subacute. Underside brownish tawny, lateral margin white. Coxæ brownish tawny, femora testaceous, tibiæ (except base) black, spines brown. Abdomen above narrowly banded black behind, shading into reddish medially, with some 2—4 minute black dots on each side near end of bands (behind) on segments 2—5; segments angular, 5—7 produced as a small spine; lateral and hindmargins beneath pale, last two segments with black disk. Supra-anal lamina transverse, very short, rounded, *middle deeply incised, the sutural angles produced as rather long, terete, acute spines*, base narrowly black, remainder pale yellow. Cerci nearly as long as the laminal spines, flat, black, apex dusky yellow. Subgenital lamina transverse, quadrangular, longer than the upper lamina, excepting the spines, black, hindmargin straight, entire. Styles inserted beneath the middle of the lateral margin, exceeding the hindmargin greatly.

Length of body	24 mm.
Length of pronotum	6 "
Width of pronotum	10 "

Hab.—Coolgardie, Western Australia. S.A. Museum; presented by Ch. French, F.L.S.

The somewhat defective specimen from the now famous Western goldfield is so distinct in its characters, that there is little hesitation in assigning its specific rank. Resembling *P. latizona* and *P. zebra* in color, it differs from them in size, texture of scutum, and the form of the anal lamina.

*Platyzosteria maculimarginata, *sp. n.*

Female. Dark brownish red. Head brownish red; antennæ, palpi, and labrum black, anterior margin of last pale. Pronotum semicircular, lateral margin scarcely reflexed, foremargin narrowly pale yellow; lateral margin and disk concolorous, with numerous remote impressed dots; hindmargin partly with a very narrow pale border. Meso- and metanotum similar, lateral and hindmargins black, latter very narrowly bordered pale. Pectus and coxæ black, latter bordered whitish; femora and tibiæ testaceous, tarsi black above, pale beneath. Abdomen above impressed rugulose, segments acutely rectangular, segment six alone with hindangles acutely produced; posterior half of each and the lateral margins wholly black; along the latter (except the sixth) in each segment a yellow spot, decreasing in size toward the apex (sometimes more or less obsolete), and more or less distinctly reproduced beneath. Supra-anal lamina transverse, sinuate, apex

rounded. Cerci? Subgenital lamina large, middle rotundately produced, laterally sinuate, valvules not free, but suture deeply and broadly impressed.

Length of body	...	...	20–22 mm.
Length of pronotum	...	...	6– 6·5 "
Width of pronotum	...	...	10–11 "

Hab.—Northern Queensland. S.A. Museum (presented by Ch. French, F.L.S.).

The species, of which two specimens are before me, appears to belong to the type of *P. trifasciata* and *picta*, m.; but is otherwise very different from any I know.

*Platyzosteria sp.

Male. Resembling *P. melanaria*. Coxæ black, bordered whitish behind; femora red. Supra-anal lamina subrotundate, margin entire or slightly emarginate. Subgenital lamina entire, with hindmargin straight, spines at the angles much shorter than the styles.

Hab.—Coolgardie, Western Australia (presented by C. French, F.L.S.).

Material insufficient for determination at present.

Periplaneta orientalis, *L.* No. 26.

Hab.—Frankston, Victoria.

Periplaneta Americana, *L.* No. 38.

Hab.—Fernshaw (?), Victoria.

Periplaneta provisionalis, *m.* (Trans. Roy. Soc., S.A., 1893, p. 108) (?). No. 45.

The species was previously described from the female alone, the above, I believe, is the male, although somewhat different, and resembles *Derocalymma* in outline.

Male. Reddish brown, scabrous, elongate, convex. Head partly free, testaceous; eyes widely apart, antennæ much shorter than the body. Pronotum elliptical, disk nearly smooth, lateral margin very narrow, scarcely deflexed, hindmargin straight, angles rounded. Meso- and metanotum angular, scabrous all over with minute raised tubercles; lobes of elytra not free, very narrow. Coxæ blackish, margins broadly tawny; femora testaceous; tibiæ brown, first tarsal joint blackish, remainder reddish yellow. Abdomen minutely scabrous, segments angular, the last two with hindangles spine-like produced, segment 7, very much rounded behind; underside red. Supra-anal lamina very narrow, elongate, triangular, apex cordately emarginate. Cerci

long, stout, blackish. Subgenital lamina transverse, very short, hindmargin rounded, entire. Styles black, rather long.

Length of body ...	... ...	15 mm.
Length of pronotum	... ...	4 "
Width of pronotum	... ...	5·5 "

Hab.—Torrens Creek, N.S. Wales *(Froggatt)*. Coll. Techn. Mus., Sydney; Fernshaw, Victoria. Localities new.

Periplaneta glabra, *Walk.* (*P. fortipes*, Walk. ?). No. 17. (*l.c.*, p. 107).

There being only a single female, the material is insufficient for certain determination. Color and texture agree very well, but the tarsi of the Victorian specimen are only half as long as those of the Northern Territory specimens, and less in size. I have also had two specimens from Mr. Froggatt, Sydney.

Hab.—Victoria; N.S. Wales. Localities new.

Periplaneta Jungii, *sp. n.*

Male. Resembling *P. picea*, Br. *Entirely deep shining black.* Pronotum elliptical, scarcely uneven, with a few remote, impressed dots; lateral margins scarcely reflexed, hindmargin straight, angles slightly rounded. Meso- and metanotum similar, lobes of elytra not free in adult. Abdomen smooth, segments rectangular, hindmargin with minute raised points, angles of two last segments produced acutely, lateral margins entire. Supra-anal lamina of male *deeply bilobed*, apex rounded, margin ciliate. Cerci flat, lanceolate, hirsute, more than twice as long as the lamina. Subgenital lamina transverse, short, hindmargin broadly and angularly indented (like "M"). Styles as long as the supra-anal lamina, and situated on the exterior angles of the subgenital.

Length of body ...	... ...	15 mm.
Length of pronotum	... ...	5 "
Width of pronotum	... ...	9 "

Hab.—Yorketown, Yorke's Peninsula.

The species is easily distinguished by the body and limbs being of a uniform deep black, and the peculiar form of the supra-anal lamina. It is named after my friend and schoolmate, Mr. Aug. Jung, who from boyhood's days associated assiduously with me and others in collecting and observing insect life, and who furnished the specimens described above.

Periplaneta parva, *sp. n.*

Female. Body convex, apterous, black, shining. Head concealed, black; labrum red, palpi dark brown, antennæ brown, with

from *one to three whitish joints* at about two thirds of the length from the base, densely ciliate. Pronotum semicircular, rectangular behind, disk smooth, hindmargin straight. Meso- and metanotum similar, hindangles slightly produced. Legs brown, trochanters and tarsi yellowish red. Abdomen smooth, segments mostly rectangular. Supra-anal lamina elongate triangular, tectiform, apex slightly emarginate. Cerci broad, not much exceeding the lamina, black. Subgenital valvules small, acute.

Length of body	12 mm.
Length of pronotum	3 "
Width of pronotum	5 "

Hab.—Sydney, N.S. Wales (Techn. Mus., Sydney, No. 4).

There are two females, to one of which a mature egg-capsule was attached on receipt. The latter is dull brownish red, with 13 distinct equilateral triangular teeth and 6 mm. in length. The species is the smallest known to me, and on account of the shortness of the cerci exhibits some affinity to Platyzosteria.

Periplaneta sp.

Male nymph. Testaceous, banded black, legs tawny. Abdomen thinly ciliate. Supra-anal lamina very transverse, broad, hindmargin produced, bilobate. Cerci large, thickly hirsute. Subgenital lamina very short, transverse, hindmargin rounded, entire. Styles marginal, longer than lamina.

Length of body	17 mm.
Length of pronotum	5 "
Width of pronotum	6 "

Hab.—New Hebrides (legit Rev. A. Gray).

Material not sufficient for identification.

Drymaplaneta submarginata, *Tepper*, *l.c.*, 1893, p. 111.

Male nymph.

Hab.—Eucla, W. Australia (legit Mr. Unbehauns, jun.). Locality new.

Genus Temnelytra, mihi.

As the females of the species included in this genus possess subgenital valvules the genus is removed from the Phyllodromidæ, where first placed on account of general aspect, to the Periplanetidæ, as a subgenus of *Periplaneta*.

Temnelytra Harpuri, *Tepper*, *l.c.*, 1893, p. 39. No. 6.

Hab.—Gippsland.

A single female in no respect differing from the type.

TEMNELYTRA SUBTRUNCATA, *sp. n.* No. 9.

Dark red to black. Head concealed, red; ocellar spots, base of antennæ, and *labrum pale tawny;* antennæ longer than the body, testaceous to brownish. Pronotum parabolic, convex, shining, *lateral margins broadly pale tawny*, disk reddish brown, shading into black, medial stripe more or less distinct, testaceous; hindmargin nearly straight. Elytra obliquely truncate towards sutural margin, in female extending to the metanotum, in the male to the second abdominal segment; lateral margin broadly pale tawny; sutural margins applied, narrowly testaceous. Scutellum rather large. Wings lobiform, apex exposed in male, lateral margin tawny; in the female wholly concealed and rudimentary. Metanotum of female and second abdominal segment of both sexes narrowly pale bordered. Abdomen shining, segments concolorous or hindmargins narrowly testaceous, angles acutely produced. Supra-anal lamina of male short, transverse, quadrangular, disk deeply depressed; of female trigonal, carinate, apex emarginate. Cerci of male lanceolate, flat, brown, more than twice as long as lamina; of female scarcely as long as lamina, else similar. Subgenital lamina of male nearly quadrate, convex; styles nearly as long, red; valvules of female normal.

	Male.	Female.
Length of body	16 mm.	18 mm.
Length of elytra	4·5 "	3·8 "
Length of pronotum	4·3 "	5 "
Width of pronotum	6 "	7 "

Hab.—Fernshaw, Victoria, (Nat. Mus., Melbourne.)

This species apparently resembles *Platyzosteria truncata*, Br., but differs in the abdomen not being pale bordered. Of the latter species only the female has been described, the elytra of which are less abnormal in form than those of the male; it should probably be removed from the genus in which it is placed and united with *Temnelytra* on that account.

The legs of *T. subtruncata* are testaceous, but the coxa blackish, bordered with pale tawny, and the tarsi paler. The abdomen beneath is deep shining black and concolorous.

TEMNELYTRA ABBREVIATA, *sp. n.* No. 20.

Female. Resembles *Stylopyga*. Pale testaceous, concolorous. Pronotum transverse, hindmargin slightly concave. Elytra rather pale, lateral margin rotundate (angles rounded), extending to first abdominal segment; sutural margin nearly straight, much shorter; apical border concave, slightly oblique, inner angle almost square and slightly rounded. Legs and underside rather pale. Supra-anal lamina broadly trigonal, apex rotundately

emarginate. Subgenital lamina transverse, hindmargin straight. Cerci normal.

Length of body	...	...	...	11·5 mm.
Length of elytra	...	...	...	3·3 "
Length of pronotum	...	...	...	3·2 "
Width of pronotum	...	...	...	5 "

This species differs from all other known to me by the short, square form of the elytra with obliquely concave apical margin.

Hab.—Narre Warren, Victoria. Nat. Mus., Melbourne.

CHORISONEURIDÆ.

Choristima, *gen. n.*

Resembling *Chorisoneura*, but the elytra more or less abbreviate, and the veins very indistinct, the longitudinal being distinctly separated (not united as in *Ectobia*).

Removed from *Chorisoneura* on account of the above differences.

Choristima hydrophoroides, *Walker*, and Ch. Loftyensis, *m.*

Transferred from *Chorisoneura* (*l.c.*, 1893, p. 114).

Choristima Kershawi, *sp. n.* Nos. 3, 41.

Testaceous. Head with a black band between the eyes, sometimes more or less obsolete ; antennæ reddish. Pronotum transversely oval, wider behind, lateral margin broad, reflexed ; disk with two broad, transverse, black bars, sometimes almost confluent, hindmargin and angles narrowly whitish. Elytra testaceous, medial stripe black, extending from anal vein to apex, latter rotundate. Wings shorter than elytra. Pectus and legs red. Abdomen above black, indistinctly varied with red, so as to form two stripes near the middle ; segments beneath with hindmargins reddish. Supra-anal lamina transverse, red, of male middle rotundately produced, of female truncate, broadly emarginate, hindmargin deflexed. Cerci long, slender, red. Subgenital lamina cucullate, hindmargin of male subtruncate, of female triangularly produced, acute.

	Male.	Female.	Nymph.
Length of body ...	8 mm.	9·5 mm.	6·5 mm.
Length of elytra ...	5 "	5 "	—
Length of pronotum...	1·8 "	2 "	1·4 "
Width of pronotum ...	3·2 "	3·5 "	2·5 "

Hab.—Near Melbourne ; Bunyip, Victoria. Nat. Mus., Melb.

The species (or variety ?) differs from both the others in being considerably larger, and from *C. Loftiensis* in the transverse bars of the pronotum being very much wider, and deep black instead of brownish.

PANCHLORIDÆ.

ONISCOSOMA CASTANEA, *Br.* (ZETOBORA ANTICA, *Walk.*). No. 35.

Hab.—Melbourne.

PANESTHIDÆ.

PANESTHIA AUSTRALIS, *Brunner.* No. 1.

Hab.—Mordialloc, Victoria. Two males. Locality new (Nat. Mus., Melb.).

The specimens agree perfectly with the original description. The males, however, appear to have the elytra and wings perfectly developed, whilst the females, as already recorded, have them irregularly abbreviated.

The Comparative Anatomy of the Cerebrum of Notoryctes typhlops.

By G. Elliot Smith, M.D., Ch. M., Demonstrator of Anatomy, University of Sydney, N.S.W.

[Read September 3, 1895.]

Hitherto no attempt has been made to describe any part of the central nervous system of *Notoryctes*, for the simple reason that no suitable material has been available for examination. In the earlier specimens of this interesting marsupial, Dr. E. C. Stirling found (38) that the condition of the brain was such as "to render an examination quite hopeless;" and though the later specimens were received in better condition, they have been used for other purposes, rather than destroy much of the skeletal and muscular systems, with a doubtful prospect of getting any useful material as compensation.

Although I have only been able to obtain the cerebrum, and that not in a perfect state of preservation, I propose, in view of the great interest attaching to this remarkable mammal, to present to this Society the imperfect results of the examination of that part of the brain. This account is naturally, from the nature of the material, very incomplete and patchy, and is published in this unsatisfactory form, since the prospect of getting any better material is very doubtful.

For the opportunity of examining this interesting specimen, I must express my deepest gratitude to Professor Wilson, who very kindly allowed me to remove the brain from one of the specimens, which he had received from Dr. Stirling for the purpose of investigating the myology. To Professor Wilson I am also deeply indebted for much of the valuable material which has been used for comparative purposes in this investigation, as well as for directing my attention to a number of papers, referred to in this account, which I would otherwise have overlooked.

As Professor Wilson had not completed the examination of the muscles of the head and neck, I was only permitted to remove that small area of the cranial roof lying between the temporal muscles in front of the superior nuchal crest. Although the task of removing an imperfectly preserved brain through such a small gap did not appear very hopeful, yet by removing the brain in segments (a course which I was reluctantly compelled to adopt) I was enabled to obtain the cerebrum without much disturbance of its parts. A relatively thick dura mater is exposed

on removing the thin cranial roof. In it there is situated a large superior longitudinal sinus, which opens on either side posteriorly into a lateral sinus lying between the cerebellum and cerebrum Whether this lateral sinus is drained mainly through the "mastoid" foramen, as in *Perameles*, or through the jugular foramen, as in most mammals, I was unable to determine. On removing the dura mater the cerebrum is exposed, as well as the relatively enormous olfactory bulb placed directly in front of each hemisphere. Posteriorly a narrow triangular gap is left between the two cerebral hemispheres and the cerebellum. When the dura mater is removed from this interval a crucial sulcus will be observed upon the dorsal aspect of the mesencephalon in its depths, corresponding to the divisions between the corpora quadrigemina. A similar appearance is to be found in *Perameles*. The interval is not so marked in other Marsupials, and in some, such as *Petaurus*, very little, if anything, of the mesencephalon can be seen until the cerebral hemispheres are divaricated. Laterally in *Notoryctes* each cerebral hemisphere only just touches the anterior border of the cerebellum. This, coupled with the fact that there is a very slight divergence of the hemispheres posteriorly, leaves the corpora quadrigemina partly exposed. In all Marsupials the mesencephalon can be seen to a very slight extent when the dura mater is removed from the brain in situ, and in *Notorcytes* and *Perameles* this exposure of the corpora quadrigemina is more marked than in others. This is opposed to the opinion of Sir William Turner, who says (40) that in all Marsupials, as in Edentata, Insectivora, Cheiroptera, and Rodentia, the mesencephalon is quite hidden by the cerebrum. Forbes (12) in *Phascolarctos*, and Beddard (1) in *Thylacinus*, admit that the corpora quadrigemina are partially exposed.

The roof of the cranium is so thin and translucent that, without removing it, the dorsal aspect of the cerebrum may be seen. Thus in Dr. Stirling's (38), figure 1, plate vii., the roof of the cranium is seen to be mapped out into four areas by a dark cross, which corresponds to a well-marked thickening of the bone internally along these lines. The transverse marking corresponds to the line of separation of the olfactory bulbs from the cerebral hemispheres. It will be noticed that, as a result of the large relative size of the bulbs, this line is placed very far back—opposite the mid-point of the zygomatic arch.

To remove the brain, the olfactory peduncles were first incised, and the lobes were then readily raised and removed. The mesencephalon was then divided, and the cerebrum easily wedged out of the cranium. In this process the infundibular region of the floor of the third ventricle was, unfortunately, damaged, so that it was impossible to determine whether any trace of optic

nerves was present. After removing the almost vertical tentorium cerebelli, the rest of the brain was picked out piecemeal. The cerebellum exhibited an extreme degree of simplicity, such as is found only in *Perameles* to my knowledge among Mammals. With the exception of these two genera, every other Marsupial with which I am acquainted has a well convoluted cerebellum, with a distinct vermis, from which the lateral mass on either side is separated by a deep sulcus, in which there is a white (medullated) nerve tract. In *Perameles*, however, the cerebellum consists of a curved folium, which forms an operculum, covering up a few rudimentary folia near the mesencephalon. The superior and posterior surfaces of this folium are almost quite smooth, only the faintest trace of two or sometimes three sulci being seen. The only indication of a division into vermis and lateral masses is the presence of two shallow furrows, but there is no medullary band. In *Notoryctes* the cerebellum is in many respects like that of *Perameles*. It appears to consist of a thin vertical slab of grey matter, which fills up the narrow interval between the posterior surface of the cerebrum and the occipital plane of the skull. Between the base of this rudimentary folium and the mesencephalon there appear to be several rudimentary folia. In striking contrast to the simplicity of the cerebellum proper, there is a large, projecting, trilobular flocculus, both in *Notoryctes* and *Perameles*, lodged in a deep floccular fossa, which extends outwards in the petrous part of the periotic almost to the surface of the skull. It will be noticed in the Marsupial series that the cerebellum proper increases in size and complexity (in the number and arrangement of folia) the larger the size of the "pallium" (using that term in Turner's sense [42]). In *Notoryctes*, where the "pallium" is extremely small, there is a corresponding simplicity of the cerebellum.

Concerning the rest of the brain (excepting of course the cerebrum) nothing can be said, since the imperfect preservation and the injuries inflicted during extraction forbid a proper examination. The remainder of this account will therefore deal solely with the cerebrum.

After examining the superficial aspect of the brain a median sagittal section was made and one hemisphere dissected. The other hemisphere was then stained with an aqueous solution of anilin blue-black and imbedded in paraffin. The block was then cut in a series of coronal sections. Considering the state of the material little was expected in the way of staining. The result, however, far exceeded my expectations, for a considerable amount of histological detail was exhibited, so that in some sections the cells of the fascia dentata and cornu Ammonis could be clearly distinguished. For this satisfactory result I am deeply

indebted to Mr. Robert Grant for his valuable assistance in staining.

Although it is interesting and instructive to compare the relative development of the various parts of the cerebrum with the corresponding regions in the brains of Edentata and Insectivora which functionally resemble *Notoryctes*, yet in its general plan of architecture the cerebrum of the latter is so essentially Metatherian that it will prove much more instructive and valuable to compare it with other Marsupials. Though the brain of *Notoryctes* may superficially present a much stronger resemblance to those of *Talpa* and *Dasypus*, yet its general morphological plan is identical with the apparently very dissimilar *Macropus* and *Thylacinus*. In these comparisons with non-placental Mammals I shall be compelled to rely almost wholly upon my own observations, in all cases made upon fresh material. So much has been written upon the Marsupial and Monotreme brain by European workers, whose descriptions—generally of bad material—have been too clearly dominated by preconceived notions of structures which one would expect to be present, or which previous writers had described, that the value of their accounts is largely discounted. As a result, many of the most fundamental points which can be appreciated at a glance in fresh material are still matters of dispute.

I very much regret that I have been unable to consult Leche's account of the brain of *Myrmecobius fasciatus* (16).*

My knowledge of the Edentate, Insectivore, and Rodent brain I owe largely to the writings of Owen (29), Hyrtl (22), Ganser (13), Rabl-Rückhard (30), Flower (11), and Turner (41, 42).

While the cerebrum of the different members of most Orders present features in common, distinguishing them from other Orders, it must be remembered that the different members of a given Order present variations in form and development which have little value for classification, being largely the expression of functional differences. Since the cerebrum is so largely modified by the habits and mode of life of the individual, too much weight must not be attached to mere resemblance between the brains of different genera. Thus the many points of striking resemblance between the cerebrum in *Notoryctes* and *Perameles* do not necessarily imply an affinity between the two genera, but merely a functional resemblance.

The Marsupial brains, which I have examined, include those of *Perameles nasuta*, *Dasyurus viverrinus*, *Phascolarctos cinereus*,

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*Since this account was written, Professor Leche has forwarded me a copy of his paper. Speaking of the cerebrum he merely states that its general features accord with Sir Richard Owen's account of the marsupial cerebrum (29).

Petaurus breviceps, *Phalangista vulpina*, various species of *Macropus* and *Potoroo*, as well as a number of fœtal specimens of these genera.

General Account of the Cerebrum.

The cerebrum of *Notoryctes* presents an extreme simplicity of structure, and relatively a diminutive size for a Mammal. It is the lowliest Marsupial brain that I have examined, and compared with the size of its olfactory bulb, it is relatively smaller than that of any other Mammal with which I am acquainted. Although its "pallial" development is far below that of both Monotremes, it exhibits features in its general plan of construction which must be regarded as superior to the Prototherian condition. Thus it exhibits a greater degree of bending than either Monotreme.* It possesses a much more compact internal capsule than *Ornithorhynchus*, in spite of the smaller "pallium."

Together with the olfactory bulb, each hemisphere has a roughly pyramidal form, with a base, which is almost vertical, directed backwards. Its superior surface presents a gradual incline backwards and upwards, whose slope may be readily appreciated from Dr. Stirling's profile view of the skull (fig. 1, pl. vi.). The maximum length is about 13 mm., of which, roughly speaking, the anterior one-third is olfactory bulb and the posterior two-thirds cerebrum (figs. 1 *et* 3). The maximum breadth of the hemisphere—near the posterior border—is 6·5 mm.; and, as may be seen from the shape of the skull, and from fig. 2, it rapidly tapers as it is traced forwards, the somewhat heart-shaped olfactory bulb forming its apex. The posterior part of the olfactory bulb is slightly wider than the anterior extremity of the hemisphere, a fact which can be readily appreciated from the shape of the cranium in Dr. Stirling's fig. 1, pl. vii. The maximum depth of the hemisphere is 10 mm.

The Olfactory Bulb.

The *bulbus olfactorius* is a large grey mass placed directly in front of, and not overlapped by, the hemisphere. It is lodged in a special compartment of the cranium, whose anterior and lateral walls, as well as the broad flat floor, are perforated by a large number of foramina. The cribiform floor of this "rhinencephalic" part (Owen) is separated from the rest of the cranial floor by a transverse bony ridge, which becomes more prominent as it is traced on to the lateral walls of the cranium. The continuation of this bony thickening in the roof forms the dark transverse line, already referred to, in fig. 1, plate vii., of Dr. Stirling's paper.

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* See supplementary note, p. 193.

The mesial surfaces of the olfactory bulbs (fig. 3, *olf. b.*) are flat and separated from one another merely by the falx cerebri. There does not appear to be any depression upon the mesial aspect of the olfactory bulb such as is found in *Perameles*, and which has been distinguished in *Didelphis* as the "mesal olfactory fossa" by Herrick (17). The inferior surface of the bulb is flat and rough from the insertion of olfactory nerves. Posteriorly it is separated from the base of the brain by a deep curved sulcus (fig. 2). The lateral aspect is rough and convex, in accordance with the shape of the cranium, and is separated from the cerebrum proper by a well-marked furrow, in which the external olfactory radiation (fig. 1, *e.o.r.*) appears to arise.

On all aspects, therefore, the olfactory bulb is separated from the hemisphere proper by a deep constriction, in the depths of which the prosencephalic part of the bulb is continuous with the hemisphere. This constricted neck of tissue will be distinguished as the *olfactory peduncle.*

The olfactory bulbs stained remarkably well with anilin blue black, and their structure was clearly demonstrated. There is a large olfactory ventricle continuous posteriorly (as in all Monotremes and Marsupials and most lowly Mammals) with the anterior horn of the lateral ventricle. The wall of the ventricle is arranged (fig. 11) in four well-marked zones—(1) a thick peripheral zone of non-medullated olfactory nerve fibres and glomeruli, (2) a clear zone containing numerous mitral cells, (3) a layer containing numerous radiating and concentric nerve fibres, and (4) a layer containing a dense mass of medullated nerve fibres, directly continuous externally with the external olfactory root, and internally with the internal olfactory root. The olfactory peduncle extends into the olfactory lobe immediately surrounding the ventricle, and forms a large mass on the other side of the olfactory ventricle, lying internal to the fourth layer described above. In the substance of this part of the peduncle the large *pars olfactoria* of the anterior commissure extends forwards (fig. 11, *p.o.*). Its fibres enter the fourth layer described above, and cannot be further traced, as they are so intimately mixed with the fibres of the olfactory radiations. There is nothing else of note to describe in the histology of this region in *Notoryctes*, as it agrees in all points with the fuller description given elsewhere (37).

The Cerebrum Proper.

In describing the cerebral hemisphere, it will be convenient to consider it under three headings—(1) the cranial or lateral, (2) the basal or ventral, and (3) the mesial aspect.

The Lateral Aspect.

The cranial surface of the cerebrum (fig. 2) appears to be quite smooth, if one excepts a shallow furrow, which, starting in front in the sulcus between the hemisphere and bulb, arches backwards and downwards to reach the ventro-lateral border of the hemisphere at about its mid-point. This groove contains the *external olfactory radiation* of Edinger—the *external olfactory root* of most writers (fig. 1 *e.o.r.*). This radiation consists of a somewhat sickle-shaped band, of a pure white color, and in *Notoryctes* is relatively very broad in front, but it rapidly tapers as it is traced backwards. An analagous arrangement of this tract is found in all Marsupials, and most lowly Eutheria, but in the Monotremes it does not form a compact strand, as in the Marsupials, but a diffuse fibre system scattered uniformly over the pyriform lobe. The depression in which it lies in Marsupials is the *fissura radicis* of Herrick (17) or *endorhinal fissure* of Turner (42). In the case of *Notoryctes* and *Perameles*, where the radiation is broad, the fissura endorhinalis should properly be placed at the ventral or concave border of the strand, since the latter really rests upon the pyriform lobe, of which the endorhinal fissure is considered the ventral limit. Apart from this slight depression, corresponding to the fibre tract, the lateral surface of the hemisphere appears perfectly smooth and free from fissures. There does not appear to be any trace of a *rhinal (ectorhinal) fissure*. It is just possible that in a perfectly fresh specimen such a fissure may be discernible, but, arguing from comparative data, one should expect it to be very indistinct and shallow, if present at all. The rhinal fissure forms the dorsal boundary of the pyriform lobe, and therefore is reckoned as a "fundamental fissure" (Turner), since it separates the pyriform from the "*pallium*" (in the restricted sense used by Turner), which lies above it. The position of the fissure upon the brain surface will depend therefore upon the relative sizes of pallium and pyriform. Thus in many Marsupials, such as *Dasyurus*, *Phalangista*, *Petaurus* and *Phascolarctos*, and in many Eutheria, such as the rabbit, it consists of a well-marked fissure on the lateral aspect, near the base of the brain. As the relative size of pallium to pyriform increases, as in *Hypsiprymnus*, *Petrogale*, *Echidna*, *Macropus*, *Ornithorhynchus*, and most placental Mammals, the fissure comes to be placed nearer the base, or even to lie entirely upon the basal or mesial aspects of the cerebrum. As, however, the proportion of pallium to pyriform decreases the position of the fissure on the lateral wall rises; in other words, the pyriform lobe takes an increasing share in the formation of the lateral part of the hemisphere. Thus in *Dasypus* (Turner, 41), *Talpa* (Ganser, 13), *Didelphis* (Herrick, 17) it is greater than in *Dasyurus*. In *Erinaceus* the

fissure is higher than in *Talpa*. In *Perameles nasuta* it is higher on the cranial aspect than in *Didelphis* or *Erinaceus;* and the pyriform lobe takes a greater share in the formation of the lateral hemisphere wall than in any other Mammalian cerebrum with whose description I am acquainted. Now, the size of the pyriform lobe varies directly with that of the olfactory bulb. In *Notoryctes* the proportion of cerebrum to olfactory is smaller even than in *Perameles*. The natural conclusion to draw is that in *Notoryctes* the proportion of pallium to pyriform is smaller than in *Perameles*, *i.e.*, that the situation of the rhinal fissure (if such a fissure were present) would be still higher up on the lateral aspect than it is in the Bandicoot's cerebrum. This opinion is borne out by histological examination.

It is to be noted that the constancy, depth, and distinctness of this fissure are apt to become less marked in animals with a small pallium. This has been pointed out in a number of Rodentia and Cheiroptera by Turner (42), in *Dasypus gymnurus* by Hyrtl (22), and is also to be noted in *Perameles nasuta*. In animals with a slightly higher pallial development, however, it becomes deeper and better marked, and is more constant. The size of the pyriform lobe is fixed by that of the olfactory bulb. The size of the pallium, however, is a very variable quantity, and does not present any relation to the development of any sense organ. It is a higher "level" of nerve-matter built upon the lower, rhinencephalic part, but independent of the latter as far as its proportions are concerned. When in the lowly Mammal a "pallium" first appears it probably, as in *Notoryctes*, forms merely a small dorsal cap lying on the pyriform lobe, and not separated from it by any fissure. The size of the pyriform is already determined, and therefore fixed, but the pallium continues to increase to a variable extent in different Mammals. As it increases *(Perameles, Didelphis)* the pallium tends to bulge over the fixed pyriform, producing a rhinal fissure. As this tendency becomes greater *(Phascolarctos, Dasyurus, Petaurus, Phalangista)* the fissure becomes deeper and much more definite, so that in all the higher forms it remains as a deep and well-marked sulcus. With its increased growth the pallium overlaps the pyriform, which thus comes to lie upon the basal or median aspect of the hemisphere, as in *Ornithorhynchus*, with its small pyriform and large pallium *(vide* 36, fig. 1). The appearance of the rhinal fissure and the constancy of the pyriform lobe can thus be explained on developmental and comparative grounds, without resorting to groundless and far-fetched hypotheses, such as those of Hill (19). The pyriform lobe is practically smooth in all Mammals, because its size is determined by the relative size of the olfactory bulb, and its form fixed before the pallium becomes convoluted. In

other words, it reaches its height of development early in entogeny as in phylogeny, and has almost ceased growing, at a time when the continued active growth of the pallium becomes manifest by the production of gyri and sulci. Hence the pyriform always is and remains smooth.* Behind the external olfactory radiation the pyriform lobe is prolonged downwards to form a marked protuberance at the postero-inferior part of the hemisphere. This is the *natiform eminence* (fig. 1, *n.e.*) To this posterior part of the pyriform lobe, which is often called the *lobus hippocampi*, the term pyriform is often restricted (Turner 42), the anterior part of the lobe proper being considered part of the olfactory peduncle. An examination of the cerebrum of Platypus shows at a glance the inconsistency of this distinction. In *Ornithorhynchus* the pyriform lobe forms a uniform band extending from the sulcus between bulb and hemisphere in front to the extremity of the latter behind, and throughout exhibits uniformly the characteristic features of the lobe, as described in the rabbit by Koelliker (15). The natiform eminence is largely the expression of the bending, which takes place in the posterior pole of the hemisphere in Mammals.

In Platypus, where the bending is slight, there is therefore no natiform eminence. In other Mammals, when the bending takes place, the pyriform, which occupies the concavity of the bend, tends to be crowded into a smaller space, and to overcome this tendency bulges posteriorly. This is all the more marked, since in all animals the pyriform (like the cerebrum itself) is larger and deeper posteriorly, in conformity with the shape of the skull. Another evidence of this bending is seen in the *vallecula Sylvii*, which Turner considers as the anterior limit of the pyriform lobe. It is probably merely the result of the bending.

The term *hippocampal*, which is often applied to this region, is very unfortunate, and the cause of considerable confusion. The close relation of the pyriform to the hippocampus in Eutheria is largely fortuitous and not essential. In Marsupials in the greater part of its extent the subiculum cornu Ammonis does not form part of the gyrus hippocampi or of the pyriform lobe, this relation only obtaining at the posterior extremity (descending horn) of the hemisphere. In placental Mammals this is the only part of the hippocampus which survives the revolution in cerebral structure, which the appearance of a corpus callosum creates ; and hence there is a close topographical relation between the whole of the hippocampus and the posterior part of the pyriform. But the pyriform lobe, *lobus hippocampi*, and *gyrus hippocampi* have

* In certain animals, such as *Echidna* and the pig, the surface of the pyriform lobe may become wrinkled.

no essential relation to the hippocampus, so that it would be wise to discard the use of the term hippocampal, as applied to the pyriform lobe, altogether. As examples of the confusion which such a nomenclature causes one might cite the examples of Herrick and Bawden speaking of the hippocampus, when from the context they evidently mean the pyriform, and Beddard (1) calling the rhinal fissure hippocampal.

On the lateral aspect of the hemisphere there will be noticed below the external olfactory radiation a large hemispherical mass (fig. 1, *t.o.)* of a pale-grey color and almost as large as the natiform eminence. This is the *tuberculum olfactorium.* It will be more satisfactory if its description be deferred until the base of the brain is being described. The whole surface of the pyriform lobe and tuberculum olfactorium is pale, from the fact that they both receive a medullary coating in the form of arching white fibres from the external olfactory radiation. [The direction of these fibres is indicated in fig. 2 by a number of curved lines on the right side of the figure.] In all the brains which I have examined these fibres extend as high as the rhinal fissure, so that in a fresh brain of *Notoryctes* almost the whole lateral aspect of the hemisphere would be white, as it is in *Perameles.* In all the Marsupial and Monotreme cerebra which I have examined histologically these radiating white fibres terminate both by means of naked end branchings and collaterals in relation to the pyramidal cells of the region. These cells, in addition to their large peripheral protoplasmic processes, are provided with large basal processes, and hence have been distinguished in the rabbit's brain as "Doppelpyramiden" by Koelliker (15). The fibres spreading out over the tuberculum olfactorium terminate in a similar manner in relation to the small multipolar cells of the region.

The Basal Surface.

The inferior aspect of the cerebrum is very irregular, and slopes downwards and backwards from the olfactory bulb to the natiform eminence. Immediately behind the olfactory bulb, there may be seen on either side of the middle line the huge protuberance forming the tuberculum olfactorium (fig. 2, *t.o.*). Bounding this laterally and posteriorly will be seen the crescentic external olfactory radiation (fig. 2, *e.o.r.*), which rapidly tapers as it is traced backwards and inwards to end in a little tubercle of grey matter (fig. 2, *), which is placed over the anterior extremity of the nucleus amygdalæ. Behind the tuberculum olfactorium is the more laterally placed eminentia natiformis (fig. 2, *pyr. l.*). As in *Perameles* and *Erinaceus*, all that can be seen of the base of the cerebrum belongs to the "rhinencephalon" of Turner (42). In animals a little higher in the scale of pallia

development (such as *Dasyurus*, *Petaurus*, *Phalangista*) the rhinal fissure, and therefore part of the "pallium" would be seen in a basal view of the brain. In Platypus, with its small pyriform and large pallium, the rhinal fissure is quite near the middle line of the base.

The huge size of the tuberculum olfactorium gives quite a characteristic appearance to the base of the brains of *Notoryctes* and *Perameles*. Ganser says (13) that in the mole this part of the brain, which he calls "*Rinde am Kopf des Streifenhügels*," is larger than in any other animal with whose cerebrum he is acquainted. In *Perameles*, however, it is much bigger, and more prominent than it would seem to be in *Talpa* (Ganser), *Dasypus* (Turner), *Erinaceus*, or *Chlamydophorus* (Hyrtl), all highly macrosmatic animals. In *Notoryctes* it reaches a still higher development, forming a hemispherical mass, which is almost as large as the eminentia natiformis. In the macrosmatic *Hypsiprymnus* and *Dasyurus*, although it is large and prominent, it appears small and flat when compared with the same region in *Notoryctes*. In *Phalangista* and *Petaurus* it is almost quite flat, corresponding to the lesser development of the olfactory organ. In such it can readily be homologised with Broca's (5) *espace quadrilatére* or *middle (grey) olfactory root*. In *Macropus* and *Petrogale*, although it is large, it is not prominent, owing to the large size of the rest of the brain. In *Ornithorhynchus* it forms a small elliptical swelling. In *Talpa*, and apparently also in *Chlamydophorus*, according to Hyrtl's notes, it would appear to be little, if anything, larger than in *Dasyurus*. This will give some idea as to its immense size in *Notoryctes*. Superficially it is covered by a medullary coat from the external olfactory radiation. In addition to the names already applied to this mass above, it has been distinguished in *Didelphis* and Sauropsida as the "*post-rhinal lobe*" by Herrick (17). It corresponds to the "*orbital lobe*" of Turner in *Dasypus sexcinctus* (41), and possibly to Burckhardt's "*lobus post-olfactorius*" in *Protopterus annectans*. In man its homologue is probably found in the atrophic grey matter found in the *locus perforatus anticus* of Vicq d'Azyr.* It is intimately connected with the olfactory bulb, and varies in size with that organ. It is therefore ridiculous to exclude it from the rhinencephalon as Hill has done (19) in the case of *Ornithorhynchus*.

This peculiar development of the base of the brain has a

* In all Marsupials and Monotremes there is a small flat area behind the *tuberculum olfactorium*, which corresponds to what Burt Wilder calls the "portio depressa" in the cat. This is the true homologue of the *locus perforatus*. In man, where the tuberculum atrophies and no longer forms a prominence, the term is vaguely used for the whole region.

marked influence upon the conformation of the basis cranii. As no attempt has been made to describe this part of the skull in *Notoryctes*, it may be of interest to add brief notes of what could be made out in a "wet" specimen.

A comparison of the brain and cranium in the Proto- and Meta-theria affords a number of instances of the mutual moulding influence of these two parts upon one another. Thus in *Echidna* the cranial cavity is very short—possibly for phlyogenetic or functional reasons—and offers a restraining influence upon the pallium as it tends to increase in the sagittal direction. As a consequence the pallium becomes convoluted mainly in a transverse direction, so that, with the bending of the hemisphere, its fissures have a radiating arrangement. In the higher Metatheria the elongated form of the cranium allows a greater sagittal extension of the cerebrum, so that the transverse or radiating folding of *Echidna* is not found in Marsupials; but in all the higher forms there is a long narrow, somewhat pointed frontal pole—*Macropus*, *Thylacinus*, *Thylaceo* (Gervais, 14). These are examples of cerebral folds directly resulting from the restraining influence of the cranial wall upon the growing pallium. In the case of the tuberculum olfactorium and olfactory bulb it is clearly demonstrated how that local conditions of over-growth—localised hypertrophy of certain regions—can produce irregularities in the brain surface, which mould the growing brain-case and determine to a large extent its shape.

The united basi-occipital and basi-sphenoid mass forms a relatively broad, gradual slope, which extends from the *foramen magnum* upwards and forwards as far as the *foramina lacera antica*. This sloping surface is perforated on either side of the middle line at about the middle of the basisphenoid by the carotid foramen. Between these foramina the pituitary body rests upon the basisphenoid, roofed over by a thin fold of dura mater. Dr. Stirling, who described (38) such of the inner aspect of the cranium as could be seen through the *foramen magnum*, says that the floor "rises in front of the basisphenoid region into a well-marked eminence, which slopes away on either side. Anterior to this again the floor is flat." The anterior flat area is the broad cribriform plate of the ethmoid. In the middle line this is continued backwards into the well-marked eminence, which appears to be formed by the meeting of the orbito-sphenoids. On either side of this ridge, and behind the cribriform plate, the floor rapidly slopes away into a well-marked hollow, which lodges the tuberculum olfactorium. The posterior part of this hollow is formed by the alisphenoids, whilst laterally it extends well on to the lateral cranial wall, where the parietal takes a share in its formation. Mesially it extends as far as the basisphenoid.

Extending forwards and outwards into each of these fossæ there is a fissure—the sphenoidal—which, with its fellow of the opposite side, forms a blunt V-shaped slit, which limits the sphenoethmoidal eminence posteriorly. The *foramen ovale* is external to the carotid foramen. Immediately external to the former the alisphenoid is raised into a large thin-walled eminence, which extends forwards as far as the fossa for the tuberculum olfactorium. This is the roof of the tympanic bulla and corresponds on the brain to the deep depression behind the tuberculum and slightly internal to the pyriform lobe. In *Perameles* the corresponding structure only extends forwards as far as the level of the *foramen ovale*. This bulla in *Notoryctes* forms a large well-marked eminence of elliptical outline, whose posterior extremity touches the tip of the petrous temporal, which is directed forwards. In this way a deep fossa is formed for the natiform eminence on the outer side of the bulla. The greater part of this fossa is formed by the alisphenoid, but it is bounded also in part by the petrous and squamous temporals. The opening of the large floccular fossa on the dorsal aspect of the petrous periotic is directed inwards and forwards. The attachment of the tentorium cerebelli to the basisphenoid helps to deepen the trough in which the large trigeminal nerve lies, and separates it from the pituitary.

The resemblance between the base of the brains of *Notoryctes* and *Perameles* is much more striking than is that of the *basis cranii*. The brain is modified directly in relation to certain functional demands, whereas the basis cranii is moulded to accommodate the altered brain, without modifying its essential morphology.

Mesial Aspect.

In the greater part of its extent the mesial surface of the cerebrum is flat, and separated from the corresponding part of the other hemisphere by the falx cerebri. Posteriorly and inferiorly, however, it is deeply hollowed out, or rather, pushed outwards by the thalam- and mes-encephalon, the upper part of the posterior extremity of the hemisphere forming a kind of cap for these structures. At the anterior and lower part there is a large pale area (fig. 3 *p.a.*), which is situated immediately behind the olfactory bulb. Elsewhere (36) I have proposed the name *precommissural area* for this region. Inferiorly it is directly continuous with the tuberculum olfactorium *(t.o.)*, from which it differs in being of a lighter color. Dorsally it is continuous with the anterior extremity of the fascia dentata *(f.d.)*, while posteriorly it is directly continuous with the thickened lamina terminalis (*s.*), which is the homologue of the septum lucidum of Eutheria. It resembles the latter structure very closely histo-

logically as well as, probably, functionally, and the two regions are very closely associated in development. They resemble one another, moreover, in the fact that they both transmit fornix fibres, and, like the tuberculum olfactorium, present a very atypical cortical structure, which consists of diffusely scattered small polyhedral cells, and which has no ventricular medullary coating. Meyer (26) is of opinion that these regions ought not to be called cortex, and calls them "*ganglion masses.*" This precommissural area is the homologue of the "intraventricular lobe" of Herrick (17), the "Fornix-leiste" of Edinger (9), the anterior part of the "septum pellucidum" in Reptiles according to Meyer (25), the "Ammonswulst" of Rabl-Rückhard (31). It forms the anterior part of the region called "septal area" by Huxley and Flower (11). It is pale in color, from the fact that a large number of fornix fibres, which Huxley distinguished as "precommissural fibres" lie in its substance, separated from the surface by a slight grey coating.

The rest of the grey matter of the mesial hemisphere wall is divided into two almost equal parts by a well-marked regularly-arched sulcus—the *fissura arcuata* (Arnold) or hippocampal fissure (fig. 3, *h.f.*). The fissure begins in front, just behind the olfactory bulb, and slightly nearer the dorsal than the ventral margin of the hemisphere. From this point it curves backwards parallel to the margin of the hemisphere to terminate at the "temporal" pole. The external lip of this fissure is the *subiculum cornu Ammonis.* It is pale, from the presence of the superficial medullary lamina of the hippocampus. Corresponding to the concavity of the fissure, there is a broad band of grey matter concentric to the subiculum. This is the *fascia dentata*, which is also pale from the presence of medullated fibres in its molecular layer. Lying internal (concentric) to the fascia dentata *(f.d.)* is the broad white band of the *fimbria (fi.)*, separated from the fascia dentata by a shallow fimbrio-dentate sulcus. The great width of the fimbria is striking, especially when seen in transverse section (fig. 5, *fi.*). The posterior part of the vertical portion of the fimbria (just that part, as it happens, which in fig. 3 is shaded, corresponding to the depression for the mesencephalon) is quite grey in color from the fact that the cornu Ammonis may be seen through the very thin layer of alveus fibres in this region. In the whole extent of the choroid fissure the fimbria is related to it, forming either its dorsal or posterior boundary.

Immediately behind the precommissural area there is the thick mass of grey matter which is developed from the lamina terminalis. It is bounded below by the anterior commissure, which really lies in it, and dorsally it is separated from the fascia dentata in *Ornithorhynchus* by the hippocampal commissure (37)

When the hippocampus bends down posteriorly with the hemisphere, as it does in Marsupials, the hippocampal commissure takes a corresponding bend (35), so that it limits the thickened lamina terminalis behind and below as well. This thickened lamina terminalis represents the septum pellucidum of Eutheria, and corresponds to the appearance seen, according to Marchand (23) and Paul Martin (24), in the development of the commissures of higher Mammals. It corresponds to part of Rabl-Rückhard's (31) "*Ammonswulst*," which lies external to, rather than below, the hippocampal commissure in Reptiles. In the evolution of the septum lucidum a gradual progression may be seen from Reptiles to Platypus, from the latter to the Marsupial condition, and from the latter to the lowly Eutheria such as *Erinaceus* or the Edentata.

The large rounded section of the anterior commissure will be seen in the lower part of the lamina terminalis, and in the upper part the large V-shaped sagittal section of the hippocampal or fornix-commissure. The relative size of these two commissures is about the same as in *Perameles*. The hippocampal commissure of course varies directly in size with the hippocampus. The anterior commissure, however, is a compound bundle, composed of a rhinencephalic and a pallial part, each of which varies with the size of its area of "Ursprungzellen." In Eutheria, however, a considerable part of the pallium is connected by the corpus callosum. Hence in them the size of the anterior commissure will depend largely (but not wholly) upon the size of the olfactory bulb (of course the pyriform and tuberculum increase proportionately to the bulb). Thus among the Edentata with their small pallium and large rhinencephalon (Turner, 41, Rabl-Rückhard, 30) and in *Erinaceus* (Flower, 11), the anterior commissure is very large. In all Marsupials and Monotremes it is large, because it takes the place of the corpus callosum, and connects the whole of the pallium, so that it is very large in the higher members like *Echidna*, *Macropus*, and *Thylacinus*, which have large pallia.

In *Notoryctes* (as in all Marsupials) the hippocampal commissure is bilaminar (fig. 10), consisting of a dorsal (*ps.d.*) and a ventral limb (*ps.v.*), connected posteriorly by a "*splenium*" (*spl.*). These two parts do not, however, correspond to the *psalterium dorsale et ventrale* of Honegger (21) in placental Mammals, since the ventral limb (*ps.v.*) of the Marsupial hippocampal commissure is the representative of the *whole* psalterium of Eutheria (35). In addition to the hippocampi, the hippocampal commissure also connects the precommissural areæ. This part corresponds to the "corpus callosum" of Herrick and the "*commissura pallii anterior*" of Rabl-Rückhard (31). Arguing from the arrange-

ment of the commissures and the parts they connect in *Ornithorhynchus* one would expect the whole of the dorsal commissure of Sauropsida to be hippocampal and the parts it connects hippo campus. The accounts of Meyer and Edinger of the structure of these parts of the reptile brain afford strong confirmatory evidence in favor of this presumption; and there does not seem to be the slightest ground for the belief that a corpus callosum is present in any animal outside the Eutheria. Osborn's attempt (27) to demonstrate this clearly shows the weakness of his case by the manner in which he misrepresents the condition of affairs in the foetal *Macropus*, which, as the connecting link in his series between the Eutheria (where alone *à priori* the presence of a corpus callosum is granted) and the submammalia, forms the crux of the whole argument.

It will be noticed from fig. 3 that the fascia dentata is exposed in the whole of its extent, and forms a considerable segment of the mesial hemisphere wall. In a transverse section through the hippocampus in *Notoryctes* (fig. 6) it will be seen, moreover, that the fascia dentata *(f.d.)* in its whole width forms part of the mesial hemisphere wall. In *Perameles* (fig. 7), although it still shares in the formation of the mesial surface, it will be seen that a considerable part of it is overlapped by pallium. In Platypus in the greater part of its extent (fig. 8 and 36, fig 1), and in *Macropus* (fig. 9) in the whole of its extent, the fascia dentata does not form any part of the median surface of the cerebrum, being completely hidden by a pallial operculum.* In *Petaurus*, *Phalangista*, and *Potoroo* the fascia dentata is hidden throughout. In *Dasyurus* and *Phascolarctos* it is partially exposed, but in *Perameles* and *Notoryctes* it may be seen throughout. In addition to this effect of the increased development of the pallium in hiding the hippocampus, it also has an influence upon the morphology of the region. Thus in no other Mammal does one find the simplicity of arrangement which the hippocampus of *Notoryctes* presents (fig. 6), an appearance which recalls the foetal hippocampus in *Perameles* and *Macropus*. In any non-placental Mammal, however, if the hippocampal region be examined at its anterior extremity the complexity of the region gradually disappears by the gradual unravelling of the complicated folds, which are seen in figures 7, 8, and 9. In this process of simplification a stage may be found in any Metatherian brain closely resembling that exhibited throughout in *Notoryctes*. It may be readily seen in any Monotreme or Marsupial brain that the pyramidal

* In all Marsupials and Monotremes the anterior extremity of the *fascia dentata* appears on the surface; so that the above remarks only apply to that part which is placed behind the situation of the hippocampal commissure.

and polymorphous cells of the cornu Ammonis become continuous at the upper (figs. 6 and 8) border of the fascia dentata with the *stratum granulosum* and *nucleus fasciæ dentatæ*. The fascia dentata, together with the nucleus fasciæ dentatæ, forms a single convolution, so that the opinions of Duval (7), Golgi, and Sala (32), that these two parts are independent receives no confirmation from the examination of the Metatherian condition. The fascia dentata (including the nucleus fasciæ dentatæ, as Henle, Krause, Huguenin, Schwalbe, Meynert, and Obersteiner, among many others, consider it) forms the edge of the true cortical structure, although it is nowhere a morphologically free edge. In the greater part of its extent the hemisphere wall has a morphological representative in the epithelial fold of the choroid plexus. In front of the foramen of Monro, where the choroid fissure is absent, the fascia dentata (with its deeper layer, the "nucleus") becomes continuous inferiorly with another part of the hemisphere wall, which lacks a cortical structure—the precommissural area, which Meyer has described as a ganglion mass without cortex (26). Thus the fascia dentata in the whole of its extent forms the edge of the true cortex. These statements are borne out by the examination of series of fœtal *Ornithorhynchus*, *Perameles*, and *Macropus* brains.

Although it will be granted that the *pes hippocampi* is a very specially modified part of the cortex, still there does not appear to be any justification for believing, with Giacomini, that it does not represent any convolutions, since it is already highly convoluted in brains otherwise smooth. The hippocampus is equally convoluted in all Mammals, because it reaches its maximum development quite early in the phylogenetic history of the individual. Thus in Platypus it possesses a histological differentiation, quite as complex and fine, as is found in the highest mammal. Like the pyriform, it is developed early both in phylogeny and ontogeny in accordance with the development of the olfactory apparatus. Because part of the smell centre should reach a high state of development, when the pallium is not proportionately intricate, is no argument that the cortex of the smell centre does not behave like the rest of the cortex in similar circumstances. It should be noted, however, that, intimate as is the connection between the hippocampus and olfactory lobe, the relative sizes of the two parts are by no means constant. Thus, in spite of the marked relative difference in the sizes of the olfactory bulb in *Ornithorhynchus* and *Perameles*, there is little appreciable difference in the sizes of their hippocampi. In *Notoryctes* the size of the hippocampus is relatively small, considering its huge olfactory. What determines the size of the hippocampus is hard to say.

In studying such a brain as that under consideration, one can-

not but be struck with the inappropriateness of Broca's limitation of the limbic lobe (4). Thus Schäfer says (34, p. 155):—"The *callosal gyrus*, with its continuation the *hippocampal gyrus*, were separated by Broca, on morphological grounds, from the other parts of the hemisphere, as a distinct lobe, intimately united in front and below with the olfactory lobe; and the name of *grande lobe limbique* was given by him to these combined lobes. To this lobe of Broca, Schwalbe added the other central parts of the mesial wall of the hemisphere, viz., the *lamina septi pellucidi* and the *dentate convolution*, as well as the *fornix;* . . . naming the whole lobe thus reconstituted the "falciform lobe," the olfactory lobe being, however, excluded." In this modified form Broca's idea is generally accepted to-day, as the above quotation from a recent standard text-book shows.* Yet, what grounds had Broca for this definition of his lobe? As the result of an examination of a series of Mammalian brains, he came to the conclusion that the different parts of this lobe, "qui peut donc être comparé à une raquette dont l'anneau entourant le seuil de l'hémisphère," was intimately connected with the olfactory bulb. The callosal gyrus, however, is not connected with the olfactory lobe, and the only relation which it has with the rhinencephalon is by means of associating fibres, such as proceed also to other parts of the pallium. The callosal gyrus therefore, from the histological and comparative standpoint, has no more right to be considered as part of the limbic lobe than any other part of the pallium. Again, a glance at the cerebrum of *Notoryctes* shows that the "limbic lobe" of Broca is not "*limbic*," since it does not form the border of the hilus. The true limbic lobe (which is also undoubtedly associated with the olfactory) is formed of a morphological dorsal limb—the hippocampus, and a ventral—the pyriform lobe meeting behind (*vide* 36, fig. 1), where the latter overlaps the former; and united in front by the precommissural area and tuberculum olfactorium. In *Notoryctes* (fig. 3) the true upper limb of this lobe forms not only the upper, but also the posterior, and part of the inferior, arcs, the pyriform forming the anterior part of the inferior arc. The limbic lobe, as thus defined, corresponds to Turner's "rhinencephalon." In Eutheria where the dorsal—horizontal—limb of the hippocampus disappears, the rudiment of that structure—the *induseum griseum* of Obersteiner (*gyrus supracallosus* and *gyrus geniculi* of Zuckerkandl (43) including the *striæ Lancisii*)—represents the dorsal limb, with the *gyrus subcallosus* of Zuckerkandl, and *locus perforatus anticus* as anterior connections.

**Note.*—Debierre (6) has recently questioned the propriety of including the callosal gyrus in the falciform lobe (as also has Edinger, 8), and came to the same conclusion as that arrived at here, though working from a different standpoint.

In *Notoryctes* it will be seen that the "*limbic lobe*" forms the great bulk of the cerebrum, the dorsal limb or hippocampus extending almost to the outer margin of the hemisphere, and the ventral limb or pyriform extending round the ventral border to form the greater part of the lateral wall. Thus as the pallium diminishes the two limbs of the falciform lobe approach one another at the dorsal part of the cerebrum. If the pallium were reduced much below that of *Notoryctes* the hemisphere would be practically "limbic lobe." I have already referred to the fact that in reptiles the hippocampus even extends from the mesial on to the dorsal surface. If, then, the statement of Meyer (26) that "die Rindenabteilung, welche bei den Säugern der inneren Kapsel Ursprung giebt, ist bei den Reptilien noch nicht entwickelt" be accepted, it must be admitted that the hemisphere of Reptiles is reduced to "limbic lobe," *i.e.*, that the pallium (in the sense of Turner) disappears. This is supported by Edinger's statement (10) that a pallium is "added," and by Brill's belief that the cerebrum of submammalia is wholly olfactory (3).

The extremely intimate connection of the peripheral olfactory apparatus with the cerebrum of lower vertebrates, and even in the majority of Mammals, is a very significant fact when contrasted with the much slighter connections of the other sensory apparatus.

The olfactory sense has a physiological significance in lower Mammals which it is hard to over-estimate. It constitutes, as Broca has pointed out (5), the guide and director of the animal in the absence of a higher intelligence. In an animal as high in the scale of intelligence as the dog it constitutes the main source of information in its search for food and in its recognition of the other sex. How much more important must the sense of smell be in the sightless *Notoryctes*, with practically no pallium as a basis for intellectual operations! In its search for food and in its sexual relations—the two pursuits which must constitute almost its whole existence—it relies almost solely upon its sense of smell, which as a kind of highly specialised and complicated reflex guides the animal through life.

Associated with this extreme physiological importance of the sense of smell the olfactory organ presents many unique anatomical features. The peripheral part of the olfactory apparatus maintains in the highest Mammals a simplicity of structure which characterises the whole peripheral sensory apparatus in worms, according to Lenhossek and Retzius,—a fact which is probably indicative of a very early specialization of function. This peripheral apparatus early in development obtains an insertion into a diverticulum of the cerebrum itself—into its morphological anterior pole. Early in phylogeny this part of the cerebrum, which

is now entirely given up to the olfactory apparatus, becomes closely associated by numerous fibre strands with the earliest parts of the cerebrum to appear—the tuberculum olfactorium, the corpus striatum, the pyriform and hippocampus.

Thus, just as the earliest psychical life—if such an expression may be used—is largely influenced by olfactory impressions, so the early morphology of the cerebrum is dominated to a large extent by the olfactory apparatus.

Lateral Ventricle.

The lateral ventricle is a narrow slit-like cavity, with a descending posterior and a descending anterior horn, of which the olfactory ventricle is a diverticulum. Projecting into the ventricle in the whole of its extent is the large *hippocampus major* (figs. 4 and 5, *h.*) on its inner wall. This is of a white color, owing to its coating of alveus fibres. The inner wall of the anterior part and of the anterior horn is largely formed by a prominent grey mass, which is the combined "septum lucidum" and precommissural area. The roof and upper part of the lateral wall is formed by the *corona radiata* (figs. 4 and 5, *cr.*). The floor and lower part of the lateral wall is formed by the grey mass of the corpus striatum.

The degree of bending of the lateral ventricle is one of the features by which the Monotreme is distinguished from the Marsupial cerebrum. Thus in *Notoryctes* the bend of the ventricle to form a descending horn posteriorly is more extensive than that found in Echidna, and much greater than that found in *Ornithorhynchus*, in spite of the much higher pallial development of both Prototheria.*

The Corpus Striatum.

The corpus striatum forms a plump elongated grey mass which projects into the lateral ventricle and extends into its descending horn. It is separated from the cortex externally by a thin layer of medullated fibres, which constitutes the corona radiata (fig. 5, *cr.*). In the greater part of its extent the corona radiata forms a kind of shell (fig. 4), which supports the corpus striatum. In front of the anterior commissure the corpus striatum extends into the tuberculum olfactorium with which it is closely connected; hence the name which Ganser applied to the latter structure (13). Behind the anterior commissure the grey matter of the corpus striatum is directly connected with the cortex of the pyriform lobe, the connecting bridge being the *nucleus amygdalæ* (fig. 5, *n.a.*). Throughout its whole length the corpus striatum is divided

* See supplementary note.

into *nuclei caudatus* (figs. 4, 5, *n.c.*) and *lenticularis* (*n.l.*) by an imperfect *internal capsule* (*i.c.*). The internal capsule consists of a number of scattered bundles of fibres, which, however, form a more definite tract than the scattered fibre-system in *Platypus*, in spite of the larger pallium in the Monotreme.

Fibre Tracts in the Cerebrum.

It will not be necessasy to do more than mention the general arrangement of the fibres, since it does not differ to any extent from that found in other non-placental Mammals, the disposition of whose cerebral tracts I have described in greater detail elsewhere (37). The corona radiata (*c.r.*) forms the deepest layer of the cortex cerebri, forming the lateral wall of the lateral ventricle above and an external capsule below, separating the corpus striatum from the cortex (fig. 5). No *centrum semi-ovale* can be said to exist. Above the ventricle the corona becomes very thin, and terminates in the region of the subiculum cornu Ammonis, where its fibres mingle with those of the alveus. Below, a very considerable proportion of its fibres cross the middle line in the lamina terminalis, forming part of the anterior commissure. The anterior commissure connects the corpora striata, "pallia," pyriform lobes (including nuclei amygdalæ), tubercula olfactoria, and olfactory bulbs (probably only the prosencephalic part and peduncle). The *pars olfactoria* of the anterior commissure consists of a very large compact bundle (fig. 11), which takes a sudden bend forwards in the corpus striatum, and, passing through the olfactory peduncle on the outer side of the ventricle, radiates into all parts of the olfactory bulb, closely intermingled with the fibres of the olfactory radiations.

There is no justification for dividing the rest of the commissure into *pars frontalis* and *temporalis* (Flower, Osborn). The great bulk of the anterior commissure corresponds to Koelliker's *pars posterior* (15), which runs in the external capsule. In considering this part of the commissure in Marsupials it must always be remembered that a considerable proportion of these fibres represent the corpus callosum of Eutheria, and therefore cannot be compared to any part of the anterior commissure proper.

The fornix system in *Notoryctes*, as in all Marsupials, exhibits an extreme simplicity, and is not divided up into *fornix obliquus* or *f. longus* of Forel, nor is the *stria Lancisii* separated from the rest of the fornix fibres.

It will suffice to give here little more than a list of the olfactory tracts, elucidated mainly by comparison with *Perameles*.

a. The *external olfactory radiation* (Edinger) arising in the olfactory bulb and terminating upon the surface of the pyriform lobe and tuberculum olfactorium.

I. The pyriform lobe is connected by association fibres to the nucleus amygdalæ, corpus striatum, and pallium of its own side, and with the pyriform of the opposite hemisphere by the anterior commissure.

II. The tuberculum olfactorium is intimately connected with the corpus striatum, and with the pallium by means of a large fibre bundle—the probable homologue of the *anterior segment of the cingulum* (Beevor, 2). It is also connected with the hippocampus by the *Riechbundel* of Zuckerkandl (fig. 10, *R.*).

b. The *internal olfactory radiation* (fig. 11, *i.o.r.*) arising in the olfactory bulb and terminating mainly in the precommissural area, but partly also in the hippocampus (36), and probably in the tuberculum olfactorium.

c. The *peduncular projection bundle* extends from the olfactory lobe backwards through the floor of the thalamencephalon to enter the pes pedunculi mainly. Some fibres probably terminate in the mammillary region (figs. 4 and 11, *p.p.b.*).

d. The *pars olfactoria* (fig. 11, *p.o.*).

e. The *olfactory bundle* of Zuckerkandl (fig. 10, *R.*).

I. A series of fibres arising in the precommissural area and tuberculum olfactorium, proceeding backwards in the fornix to terminate in the hippocampus.

II. A series of fibres arising from the pyramidal cells of the hippocampus, and after passing through fornix and septum, terminating in the base of the cerebrum in the region of the nucleus amygdalæ (fig. 10, *B.*).

It is to be hoped that before long better material will be available with which to supplement these imperfect notes upon the nervous system of this interesting Mammal. For, quite apart from the deep interest attaching to the anatomy of this aberrant and peculiar Marsupial, the brain of *Notoryctes* presents to the comparative neurologist quite a number of instructive features of the deepest interest and highest importance.

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* *Note.*—I had hoped that before the publication of this paper this Thesis would have been in print, but so far have only been able to publish a few short abstracts of special parts.

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DESCRIPTION OF FIGURES.

Fig. 1.—*Lateral aspect of cerebrum of* Notoryctes. x 3.

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olf.b. Bulbus olfactorius.
t.o. Tuberculum olfactorium.
e.o.r. Radiatio olfactoria externa.
n.e. Eminentia natiformis.
pyr.l. Lobus pyriformis.
p. "Pallium" *(Turner).*

Fig. 2.—*Basal aspect of cerebrum.* x 3.

* Tubercle of grey matter at the termination of the external olfactory radiation.

The lines at *t.o.* and *pyl.l.* indicate the direction of the fibres given to the tuberculum and pyriform from *e.o.r.*

Other references as in fig. 1.

Fig. 3.—*Mesial aspect of cerebrum.* x 3.

p.a. "Precommissural area" (mihi).
a.c. Commissura anterior.
s. "Septum lucidum."
h.c. "Commissura hippocampi."
f.d. Fascia dentata.
h.f. Fissura hippocampi.
fi. Fimbria.

Fig. 4.—*Transverse section through the region of the anterior and hippocampal commissures.* x 7.

[Allowance must be made in these sections for considerable shrinkage during the embedding process. The measurements in figs. 1, 2, and 3 are corrected by comparison with the skull.]

Most references as in figs. 3 and 1.

n.c. Nucleus caudatus.
i.c. Capsula interna.
h. Hippocampus.
p.p.b. Olfactory "peduncular projection bundle" (mihi)—the "middle root" of Broca.
c.r. Corona radiata.

In the septum (*s.*), on the left side, are seen numerous descending fibres. These are partly fibres of the *columna fornicis* and partly precommissural fibres of Huxley (Riechbundel of Zuckerkandl).

Fig. 5.—*Transverse section behind the commissural region. Camera lucida drawing* x 7, *from a section stained with anilin blue-black.*

h.f. Fissura hippocampi.
h. Hippocampus (the letter points to the fascia dentata).
fi. Fimbria.
c.r. Corona radiata.
n.c. Nucleus caudatus.
n.l. Nucleus lenticularis.
i.c. Capsula interna.
n.a. Nucleus amygdalæ.

Fig. 6.—*Transverse section hippocampus.* Notoryctes.

Fig. 7.—*Transverse section hippocampus.* Perameles.

Fig. 8.—*Transverse section hippocampus.* Ornithorhynchus.

Fig. 9.—*Transverse section hippocampus.* Macropus.

Figures 6-9 *are drawn to different scales, but are all taken from corresponding regions.*

alv. Alveus.
x. Subiculum cornu Ammonis.
h.f. Fissura hippocampi.
f.d. Fascia dentata.
fi. Fimbria.
c.r. Corona radiata.

Fig. 10.—*Sagittal section through the median hemisphere wall in the commissural region.* Perameles. Drawn by camera lucida. Weigert-Pal stain. x 5.

The appearance in *Notoryctes* would be almost exactly identical with this.

a.c. Commissura anterior.
ps.d. Commissura hippocampi—crus dorsale.
ps. v. Crus ventrale.
spl. "Splenium commissuræ hippocampi" (mihi).
s. "Septum lucidum" (lamina terminalis).
a.f. Columna fornicis.
R. Riechbundel des cornu Ammonis *(Zuckerkandl)* lying in the precommissural area of the median hemisphere wall.
A. Fibres of the *Riechbundel* passing directly to the hippocampus without passing through the fornix.
B. Fibres directed backwards below *a.c.* to the floor of the thalamencephalan.
j. Fibres directed forwards to the olfactory bulb and base of brain (tuberculum olfactorium and lower part of precommissural area).

Fig. 11.—*Horizontal section through the olfactory bulb and peduncle.* Notoryctes. x about 8.

p.o. Pars olfactoria commissuræ anterioris.
p.p.b. "Olfactory peduncular projection bundle."
e.o.r. Radiatio olfactoria externa.
i.o.r. Radiatio olfactoria interna, its fibres extending into the precommissural area *(p.a.)*.
v. Ventriculum olfactorium.
1. Layer of glomeruli and nerve fibres.
2. Layer of mitral cells.
3. Layer of diffuse nerve fibres.
4. Layer of compact nerve fibres.

EXPLANATORY NOTE.

An examination of a large quantity of fresh Monotreme-material since this paper was written has convinced me that undue importance has been attached to the degree of flexion as an index of a Monotreme cerebrum. Thus in *Ornithorhynchus* the hippocampus possesses quite an extensive descending limb. It is, however, of a very diminutive size, and in all my earlier specimens had become knocked off in preparation for cutting. It is so small, however, and its fimbria so insignificant that it may be neglected in discussing the morphology of the hippocampal commissure. In *Echina* also, the descending limb is much more extensive than my earlier examinations lead me to believe.

In my paper on the Platypus brain, which I expect to publish soon, the bearing of these facts will be fully discussed.

Carboniferous Foraminifera of Western Australia, with Descriptions of New Species.

By Walter Howchin, F.G.S.

[Read August 6, 1895.]

Plate X., figs. 1-8.

Some time ago I asked Mr. H. P. Woodward, Government Geologist of Western Australia, if he could procure any material of Carboniferous age that was likely to contain microzoa. Not having any of the argillaceous shales on hand, he kindly sent me a few brachiopod shells of this age which contained a little soft matrix in their interiors. Small as was the amount of material thus obtained, it has yielded three species of foraminifera which are of more than ordinary interest, not only as undescribed forms, but they are amongst the firstfruits of an old fauna in the Palæontology of Australia, of which we know but little at present.

The shells from which the material was gathered were obtained by Mr. Woodward from the Carboniferous shales of the Irwin River, about 200 miles north of Perth. With regard to these beds Mr. Woodward says—"The Lower Carboniferous outcrops upon the Irwin River, where there are a series of shales, fire-clays, sandstones, and limestones, with coal-seams. This formation extends north in a narrow strip to the Lyons River."*

The only other locality in Australia where foraminifera of this age are known to occur is in the Permo-Carboniferous Rocks of Tasmania,† but the species of the two localities, so far as recognised, are distinct.

The Western Australian material came to hand shortly before the Adelaide meeting of the Australian Association for the Advancement of Science, and the writer was able to report the occurrence and generic positions of these foraminifera in a paper read before the Association on "A Census of the Fossil Foraminifera of Australia."‡ For remarks on the distinctive features of the Australian Carboniferous foraminifera, as compared with

* Geolog. Mag. Dec. IV., vol. I., p. 545, Dec., 1894.

† "The Occurrence of Foram. in the Permo-Carb. Rocks of Tasmania," W. Howchin, Report of Fifth Meeting of Aus. Asso. for Adv. of Science, Adelaide, 1893, p. 344, pl. X., XI.

‡ *Op. cit.*, p. 348.

those of presumably the same age in the Northern Hemisphere, see the article just mentioned.

In addition to the forms described in this paper, there is also present in the material a parasitic organism of doubtful relationship. It is not clear from the few examples obtained whether the object belongs to the foraminifera or annelida. This is held over for further investigation.

CORNUSPIRA SCHLUMBERGI, *sp. nov.* Pl. x., figs. 1-3.

Ref.—Cornuspira Schlumbergi, How., MS., Report of Fifth Meeting of Aus. Ass. for Adv. of Science, Adelaide, 1893, p. 366.

Test discoidal, flat or biconvex, convoluted; consisting of a non-septate tube, slightly increasing in diameter, but with varying dimensions. Initial end of chamber spherical, and of greater diameter than the tube. Convolutions, about five in number, more or less asymmetrical, particularly in the earlier growth. Test-walls investing, each successive whorl enclosing all the preceding by alar extensions over the lateral surfaces of the shell. Periphery rounded, and somewhat irregular in outline. Septation obscured exteriorly by lamination of shell-walls, except near the orifice, where a sutural depression is visible for about half the length of the final convolution. Transverse section of tube round, or with slight vertical compression. Aperture formed by the open end of tube, more or less constricted at vent.

Diameter, $\frac{1}{40}$ in.

This is an interesting species, and diverges from the normal characteristics of the genus in two particulars—the irregular coiling of the earlier convolutions of the tube, and also in the lamination of the test-walls. The former of these features is subject to considerable variation. Some transparent sections show but slight divergencies of the spiralline arrangement of the chamber from one plane, whilst in others the tube has apparently coiled upon itself at almost right angles, as shown in fig. 3, plate x. Again, unlike other members of the genus, there is a complete investment of the earlier convolutions by successive layers of shell substance, obscuring the septation, and giving the shell a lenticular outline in transverse section. The irregular coiling of the tube in this species makes it isomorphic with *Ammodiscus gordialis* (P. & J.) in the arenaceous series. The duplication of the test-walls is a still more eccentric feature of this species. The thickening of the test in the umbilical region is produced, not by an excresence of shell substance, which not unfrequently occurs in certain species of foraminifera, but by an extension of the lateral flaps of the chambers in a similar manner to the nummulitic method of growth. This is shown in the transparent section, fig. 2, plate x.

In the lamination of the shell-walls, the present species shows a closer likeness to the genus *Planispirina* than *Cornuspira*, but the absence of segmentation in the chamber cavity fixes its position with the last-named genus.

Representatives of this genus have been observed in most geological formations of Europe, dating from the Lias, and it also occurs in rocks of Permo-Carboniferous age in Tasmania.*

It affords me much pleasure to associate the name of Mons. Schlumberger of Paris with this interesting species, not only because the transparent sections of this form now figured were kindly supplied by this eminent specialist, but the author has been laid under repeated obligation for services he has cheerfully rendered towards the working out and determination of obscure species.

NODOSARIA IRWINENSIS, *sp. nov.* Pl. x., fig. 7-8.

Ref.—*Nodosaria* species, Report of Fifth Meeting of the Aus. Ass. for Adv. of Science, Adelaide, 1893, p. 366.

Test elongate, straight or very slightly arcuate, tapering. Segments about eight in number. The shell either slightly inflated near the centre or gradually increasing in size. Chambers of greater width than length. Sutural lines straight,thick, and slightly depressed. Surface of test ornamented with numerous, closely set, longitudinal, and continuous costæ.

Length, $\frac{1}{33}$ in.

This is a Nodosarian of very short length, narrow chambers, banded sutures and finely costated surface. It does not appear to agree with any previously described species. A finely ribbed Nodosarian shell has been figured from the Permian of Durham by Mr. T. Rupert Jones† and the late Dr. H. B. Brady,‡ and referred by the latter to *Nodosaria (Dentalina) multicostata*, d'Orb. But this is a very different species from the one now described, being markedly dentaline, with subglobular chambers that rapidly increase in size with the stages of growth. Messrs. Jones and Parker have also figured§ two fragments of a costated Nodosarian from the Triassic beds of Chellaston, near Derby, which are referred by the author to *N. lineolata*, Reuss. This is, however, a much larger shell than the one found in the R. Irwin beds, and has elongated elliptically-shaped chambers. The broad banded constrictions which mark the septation in

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* *Op. cit.*, vol. V., p. 344.

† *Dentalina Kingii*, Monograph of the Permian Fossils of England, by W. King, Palæontog, Soc., 1850, pl. vi., figs. 2, 3.

‡ Monograph of Carboniferous and Permian Foraminifera, by H. B. Brady, Palæontog. Soc., 1876, pl. x., fig. 19.

§ Quart. Jour. Geo. Soc., vol. XVI. (Nov., 1860), pl. xix., figs. 11, 12.

N. Irwinensis may be compared with a similar feature in *N. vertebralis*, Batsch.; but the examples now under consideration do not exhibit the transparent shell substance in the septal bands which gives the vertebral appearance to Batsch's species. How far this feature may have been modified by age in the Western Australian species it is impossible to say. In other respects there is but slight similarity between the two species.

The genus *Nodosaria* (including *Dentalina*) is but sparingly represented in rocks of Palæozoic age. In Brady's "Monograph of the Permian and Carboniferous Foraminifera"* only three species are recorded, and the whole of these belong to the Permian or newest member of the division. A true *Nodosaria* was discovered by the present writer in one of the minor limestones of the lower Carboniferous series of Northumberland,† and a member of the same genus occurs in the Permo-Carboniferous rocks of Tasmania.‡ In the Carboniferous Limestone of the Northern Hemisphere its place seems to be taken by *Nodosinella*, a group of foraminifera with finely arenaceous tests, and which in form are to some extent isomorphic with the hyaline *Nodosariæ* of newer formations.

FRONDICULARIA WOODWARDI, *sp. nov.*

Ref.—Frondicularia species, Report of Fifth Meeting of the Aus. Ass. for Advancement of Science, Adelaide, 1893, p. 366.

Test elongate, tapering, compressed, and subject to to considerable variation in external form. Oral end broad, rounded, and regularly curved. Aboral extremity obtusely pointed. Peripheral margins rounded. Segments from seven to ten in number, gradually increasing in size, acutely arched. Final chamber relatively large, inflated, and lobulated. Sutures flush, marked by clear shell substance. Length of shell equals twice or three times the breadth.

Length of fine example, $\frac{1}{30}$ in.

This pretty little shell somewhat resembles *Frondicularia complanata*, Defr., but differs from that species in its elongate contour, fewer chambers, and conspicuous final segment. The segmentation is also less acute, particularly in the later chambers, which approach to a regular curve. A somewhat similar example to our species was figured by Messrs. Jones and Parker§ from the Upper Trias of Chellaston, Derbyshire. The authors referred to designate the form figured by them as a "variety" of *Frondicularia complanata*, Defr., but without further description. The

* Palæontographical Society, vol. XXX., 1876, pl. x., figs. 6-19.

† Jour. Royal Microscopic Society, 1888, part IV., plate ix., fig. 21.

‡ Report of Fifth Meeting Aus. Ass. for Adv. of Science, Adelaide, 1893, p. 347.

§ Quart. Jour. Geo. Soc., vol. XVI. (Nov., 1860), pl. XIX., fig. 19.

reasons which have led me to distinguish the present species from the one described by Defrance have already been stated. I have great pleasure in recognising the services of Mr. H. P. Woodward, F.G.S., Government Geologist of Western Australia (to whom I am indebted for the material that has supplied the foraminifera described in the present paper), by naming the present species after one who has done much valuable pioneer work in a country which, geologically, is but imperfectly known.

Until the present discovery the occurrence of *Frondicularice* in the Chellaston beds, referred to above, was the earliest record for the genus. The Western Australian examples carry the geological history of the genus back to the Upper Palæozoic.

Two New Species of Cretaceous Foraminifera.

By Walter Howchin, F.G.S.

[Read August 6, 1895.]

Plate X., figs. 9-13.

The southern limit of the great Cretaceous formations of Central Australia passes a little south of Hergott Springs on the main North line, 441 miles from Adelaide. At Hergott two bores, 150 yards apart, have been put down by the S.A. Government, and in No. 2 Bore a very strong artesian spring has been tapped. The beds passed through in these operations, and which in No. 2 Bore extend to a depth of 342 feet, appear to be of marine origin throughout. They consist of dark-colored mud shales and thin limestones. The section is only sparingly fossiliferous, and the foraminifera are relatively scarce. The material, however, being soft, and in a very fine state of division, can be easily reduced by washing and the microzoa concentrated. Fifty-six species in all have been noted from the bore material. A description of the microzoa of No. 1 Bore will be found in the Transactions of this Society, vol. VIII., p. 79; and a list of the foraminifera observed in No. 2 Bore has been given in "A Census of the Fossil Foraminifera of Australia," Aus. Ass. for Adv. of Science, vol. V., p. 362.

Haplophragmium australis, *sp. nov.* Pl. x., figs. 12-13.

Ref.—Haplophragmium australis, How., M.S., Report of Fifth Meeting of Aus. Asso. for Adv. of Science, Adelaide, 1893, p. 364.

Test free, elongate, crozier shaped; earlier chambers planospiral, later chambers linear. Spiral portion compressed, exca

vated at the umbilicus; periphery rounded. Linear portion cylindrical, or oval in transverse section, slightly increasing in size towards the oral extremity. Segments about ten in number, inflated. Sutural lines marked by deep incisions. Test coarsely arenaceous. Aperture simple, central; marked by umbo produced from central portion of final segment.

Length of large specimen, $\frac{1}{9}$ in.

This form differs from *H. agglutinans* (d'Orb.), with which it has close affinities, in the deep constrictions of the sutures, inflation of the chambers, and prominent oral features. The strongly-marked septation in the spiral portion gives an appearance to the chambers as though set at different angles, and thus opposed to each other in the plane of growth.

H. agglutinans is also present in the same beds, but no passage forms were noted between this last-named species and the one now described.

One example was found in No. 1 Bore at a depth between 100 ft. and 200 ft., and about half-a-dozen in No. 2 Bore at a depth of 50 ft.

PATELLINA JONESI, *sp. nov.* Pl. x., figs. 9-11.

Ref.—*Patellina Jonesi*, How., MS. Report of Fifth Meeting of Aus. Ass. for Adv. of Science, Adelaide, 1893, page 365.

Test free; superior lateral surface an elongated obtusely pointed cone; usually asymmetrical; inferior face flat or slightly concave; height equal to greatest breadth, or more; peripheral edge, obtuse, rounded. Segments, of which there are about seven on either side, cresentic (or ? annular); irregular both in size and position. Superior surface, punctured and minutely reticulated withl ines of clear shell substance. Septation often indistinct exteriorly, but sometimes marked by slight sutural depressions or swellings of the test in irregular gyrate elevations. Chamber cavities simple, undivided by septa. Central portion of test filled with irregular growth of shell substance, which also penetrates to a great extent the chamber cavities themselves.

Height of cone in average specimens, $\frac{1}{60}$ in.; diameter, $\frac{1}{70}$ in.

This is an anomalous little shell. It appears to be a *Patellina* of a very simple type. In external form it somewhat resembles the recent and very rare *P. campanæformis*, Brady, and still more closely the conical, Carboniferous form, *P. Bradyana*, Howchin, and is akin to both these species in its simple undivided chambers. But it differs from both the species referred to in the irregular form of its chambers and the generally diffused shelly deposits within the chambers as well as in the umbilical region. In the examination of minute fossil forms there is always a danger of confounding infiltration of mineral matter with the proper testaceous structure, but in the examination of transparent sections of this form it is often impossible to mark the distinc-

tion between the substance of the test walls and the confused shelly deposits,or even in some cases where the well-defined walls terminate and the irregular deposits begin. It would seem that the habit of the genus to produce secondary shell substance and irregular chamberlets has in the present species found its extreme development. The reticulated superficial layer appears to be a rudimentary form of "the external or reticulated chamber-layer," which is more definitely developed in the European Cretaceous species, *P. lenticularis*, Carter. The range of variation in the external form of this species is very considerable ; at times it forms a symmetrical cone, but more frequently the habit of growth is marked by sudden inflation or contraction of the test as shown in fig. 9.

The geological range of the genus, so far as known, dates from the Carboniferous Limestone,* but it was during the Cretaceous and Eocene periods that it reached its greatest development, not only in size, but in the range of its species and the complex structure of its investment. Since the early Tertiary period it has gradually declined until in the present day it is only represented by one or two minute and degenerate species.

About a dozen examples were found in No. 2 Bore at Hergott, at a depth of 140-150 feet.

It is with much pleasure that I name the present species after J. W. Jones, Esq., Conservator of Water, under whose direction this very successful bore was carried out, and to whose courtesy and ready assistance I have been indebted for the material obtained from this as well as other Government borings.

EXPLANATION OF PLATE X.

Figs. 1-3.—Cornuspira Schlumbergi, *sp. nov.*

1. Lateral aspect.
2. Transparent, transverse section showing lamination of test walls.
3. Transparent, horizontal section showing irregular coiling of the chambers.

Figs. 4-6.—Frondicularia Woodwardi, *sp. nov.*

4. Opaque, lateral aspect. *a.* End view of same.
5. Opaque, lateral aspect of a short and broad variety.
6. Transparent, horizontal section.

Figs. 7, 8.—Nodosaria Irwinensis, *sp. nov.* Lateral aspects of two average specimens.

Figs. 9-11.—Patellina Jonesi, *sp. nov.*

9. Lateral view.
10. Transparent, vertical section.
11. Transparent, transverse section.

Figs. 12, 13.—Haplophragmium australis, *sp. nov.*

12. Few-chambered specimen.
13. Example showing rectilineal growth. *a.* Oral view of same.

* Carboniferous Foram., by W. Howchin, Jour. Roy. Micro. Soc., Aug., 1888.

Further Notes on Australian Coleoptera, with Descriptions of New Genera and Species.

By the Rev. T. Blackburn, B.A.

[Read October 1, 1895.]

XVIII.

CARABIDÆ.

AGONOCHILA.

A. Koebelei, sp. nov. Breviter pubescens; picea, capite prothoraceque plus minusve rufescentibus, elytris fasciis 2 irregularibus valde contortis pallide testaceis ornatis, antennis palpis pedibusque testaceis; prothorace fortiter transverso, antice parum emarginato, crebre leviter minus subtiliter punctulato, lateribus fere æqualiter rotundatis bisetosis, angulis posticis fere rectis; elytris vix striatis, fere ut prothorax punctulatis. Long., $1\frac{1}{2}$ l.; lat., $\frac{4}{5}$ l.

This species may be readily distinguished by its small size and the unusual markings of its elytra. These latter consist of two strongly zigzag fasciæ the anterior of which is much wider than the posterior, its zigzags so strong as to extend from near the base of the elytra to considerably behind their middle. The posterior fascia is subapical. The markings bear a certain resemblance to those of *Eucalyptocola Mastersi*, Macl., but the two insects are very widely distinct.

N. Queensland; presented to me by Mr. Koebele.

A. stictica, sp. nov. Breviter pubescens; picea vel rufo-picea, antennis palpis pedibusque testaceis, elytris maculis testaceis senis elongatis (his longitudinaliter positis) ornatis; prothorace fortiter transverso, antice emarginato, leviter subtiliter (ad latera magis crasse) punctulato, lateribus bisetosis medium versus perspicue angulatis pone medium manifeste sinuatis, angulis posticis rectis; elytris vix striatis, subtilius sat fortiter sat crebre punctulatis. Long., $1\frac{3}{4}$ l.; lat., $\frac{4}{5}$ l.

Readily distinguished from the preceding structurally by the distinctly angulate sides of its prothorax. Very distinct from its previously described congeners by the markings of its elytra which seem to be quite constant though more or less conspicuous according as the ground-color is darker or lighter. They consist on each elytron of six testaceous elongate spots placed as follows:—One almost touching the base, two placed side by side about

the middle (the external one a trifle more anterior than the other), three near the apex placed side by side. In some examples the two middle spots just touch each other and in some the three subapical spots are slightly in contact with each other. In some examples the lateral border of the elytra is more or less pallid.

N. Queensland; presented to me by Mr. Koebele.

SCOPODES.

S. intricatus, sp. nov. Breviter ovalis; sat nitidus; niger, capite prothorace que cupreis, elytris lineis subtilibus albis intricate reticulatim ornatis, antennis ferrugineis; capite supra longitudinaliter striolato; prothorace quam caput angustiori, supra fortiter striolato, haud canaliculato, fortiter transverso, latitudine majori longe ante medium posita, angulis posticis dentiformibus, lateribus mox pone marginem anticum fortiter angulatis hinc ad basin subrectis; elytris striatis, interstitiis inæqualiter convexis (3° 3-foveolato). Long., $1\frac{3}{5}$ l.; lat., $\frac{7}{10}$ l.

Readily recognisable by the curious reticulation of fine white lines with which its elytra are ornamented; also notable for the coarse striolation of its prothorax which distinguishes it from all its described congeners except *S. rugatus*, Blackb.; from this latter it is very distinct *inter alia* by its prothorax (even in the middle) scarcely being lobed or produced hindward behind a straight line joining the dentiform hind angles.

N. Queensland; presented to me by Mr. Koebele.

STAPHYLINIDÆ.

BARRONICA (gen. nov. *Aleocharinarum*).

Myllænam simulans; antennæ breves (his speciei typicæ quam prothoracis latitudo brevioribus) robustæ, articulis basalibus 2 sat æqualibus, 3° breviori et angustiori, 4° 5° que etiam brevioribus, 6°—10° ex ordine latioribus (8°—10° transversis), 11° longitudine 8°—10° conjunctis æquali; caput in prothorace profunde immersum (superne haud præter naturam exsertum vix visibile); palpi maxillares modici, articulo apicali abrupte gracili; prothorax semicircularis (fere ut *Corylophi*) transversus; scutellum minutum; elytra quam longiora fere duplo latiora; abdomen pergracile, marginatum, a basi ad apicem fortiter angustatum (ut *Conuri*); pedes modici, tarsis anticis 4-articulatis, posterioribus 4 5-articulatis, posticis quam tibiæ vix brevioribus (articulo basali quam sequentes 3 vix breviori); coxæ inter mediis inter se modice disjunctæ.

I have unfortunately not been able to dissect a specimen successfully enough to ascertain all the characters satisfactorily and

so have had to omit some of them, but the characters specified above will enable this genus to be recognised readily. The minute insect on which it is founded is one of the most remarkable species I have seen and seems to have no near ally previously named, and I am in doubt where it should be placed. A casual glance would at once suggest placing it near *Myllæna* but its much shorter palpi and short stout antennæ seem inconsistent with such a place; I can however suggest no better. Its most remarkable character I think consists in the relation of its head and prothorax to each other which is almost exactly as in *Corylophus*, the small head being in repose laid back flat against the under-surface of the prothorax so as to be entirely invisible from above, and the outline of the prothorax being evenly semicircular so that there is no trace whatever of any front angles. The front part of the prothorax moreover is roundly declivous in front and when the head is laid back underneath projects freely over it exactly as in *Corylophus*. Another very notable character is found in the general form (which is an extreme exaggeration of that of *Myllæna*); the prothorax and elytra are exactly applied to each other so that their outline is perfectly continuous and forms a wide oval; the slender *Conurus*-like hind body looks like a thin tail and when it is raised upward the body has much the appearance of that of a miniature scorpion.

B. scorpio, sp. nov. Antice lata, depressa; nigra, antennis (apice infuscato excepto) flavis, pedibus piceis vel plus minusve sordide testaceis; subtiliter pubescens; prothorace ad elytra arcte appiicato, his longitudine sat æquali, transverso, semicirculari, postice bisinuato, subtilissime punctulato, angulis posticis retrorsum productis; elytris quam longioribus fere duplo latioribus, subtiliter fere subaspere punctulatis, postice conjunctim late emarginatis, angulis externis retrorsum productis; abdomine minus subtiliter minus crebre punctulato, segmentis ad apicem setis elongatis instructis. Long., $1\frac{1}{5}$—$1\frac{1}{2}$ l.; lat., $\frac{2}{5}$ l.

N. Queensland; taken by Mr. Koebele in the Barron River District.

QUEDIUS.

Q. Koebelei, sp. nov. Minus gracilis; sat nitidus; niger, iridescens, ore palpis antennis pedibusque testaceis, elytris obscure ferrugineis apicem versus infuscatis; antennis sat brevibus sat robustis, articulo 3° quam 2us manifeste longiori 4° 5° que subæqualibus quam 3us paullo brevioribus, 6°—10° inter se sat æqualibus quam latioribus vix longioribus quam 5us manifeste brevioribus; capite fere transverso, quam prothorax paullo angustiori, puncturis 3 utrinque prope oculum et foveis magnis 2 (his transversim positis) inter antennarum

bases impresso; prothorace modice transverso, antice sat angustato, in disco puncturis 2 interse transversim approximatis ante medium (2que inter se late distantibus in margine antico) positis et utrinque marginem medium versus puncturis 2 transversim positis impresso; scutello elytris abdomineque minus fortiter minus crebre punctulatis; elytris prothoraci longitudine æqualibus. Long., 2 l (vix); lat., $\frac{1}{2}$ l.

This small species seems to be quite distinct from all the Australian *Quedii* hitherto described. In M. Fauvel's tabulation of *Quedii* (Ann. Genov. 1878, pp. 551-2) it would be placed I think beside *metallicus*, Fauv., from which *inter alia* its diminutive size readily distinguishes it. I must say, however, that M. Fauvel's tabulation is so complicated (being designed for interpolation with another tabulation) that I do not feel sure I understand it accurately. However, all previously described species except *piceolus*, Fauv., are markedly larger than the present insect, and *piceolus* differs from it *inter alia* by the apical portion of its abdomen being red.

N. Queensland; presented to me by Mr. Koebele.

METOPONCUS.

M. cairnsensis, sp. nov. Sat elongatus; nitidus; niger, antennis piceo-ferrugineis, elytris læte violaceis, pedibus et abdominis segmentis 1° 4° que læte rufis; capite elongato parallelo, quam prothorax sublatiori; hoc elongato, disco utrinque 4-punctulato; elytris biseriatim obsolete punctulatis, prothoraci longitudine sat æqualibus. Long., $2\frac{1}{2}$ l.

Readily distinguishable by its coloring from all the previously described species.

N. Queensland; taken by Mr. Koebele near Cairns.

PALAMINUS.

P. Novæ-Guineæ, Fauv. Mr. Koebele has sent to me from the Barron River district of Queensland some examples of a *Palaminus* which agrees very well with the description of this species. It is quite possible that a comparison with the type might reveal distinctions, but at any rate the two must be extremely close. The present insect does not appear to be the allied *P. Australiæ*, Fauv., of which I believe I have an example (taken in *Victoria*) differing from the Queensland specimens by the characters that M. Fauvel specifies as distinguishing *P. Australiæ* from *P. Novæ-Guineæ*.

P. vitiensis, Fauv. Among the *Staphylinidæ* taken in N. Queensland by Mr. Koebele I find an example of a *Palaminus* agreeing well with the description of this well-marked Polynesian insect. The only discrepancy is a slight one in respect of color;

whereas in *P. vitiensis* the "apex" of the elytra should be infuscate, in this specimen the infuscation is slightly in front of the apex, leaving the extreme apex of a pallid color.

PHALACRIDÆ.

In the Ann. Soc. Ent. Fr. 1893-4 occurs an important memoir in which M. Guillebeau revises this family and enumerates a number of new genera and species including several from Australia. The author distributes the family into ten sub-families. I regret that I have been unable to arrive at any very certain conclusions as to the identification of the various sub-families and genera. As regards the sub families, some of them appear to be distinguished *inter se* by very slight characters ; the *Olibromorphini* for instance are expressly stated to agree with the *Olibrini* in everything except in the metasternal process being shorter so as not to protrude beyond the intermediate coxæ. As regards the genera they are not recognisable with absolute certainty, no diagnosis being published and there being no indication of the characters beyond the few that the author makes use of in a tabulation of genera which he supplies. This tabulation, of course, only enables one to identify the genera on the assumption (a very large one) that all the species one is examining are referable to the genera named in M. Guillebeau's table.

I have before me a considerable collection of *Phalacridæ* gathered by Mr. Koebele and placed in my hands for identification. Owing to the very scanty characters attributed to Mr. Guillebeau's genera I am unable to refer any of the above mentioned specimens with certainty to any of those genera—but on the other hand there are none of those specimens which I can say with certainty do *not* belong to his genera. Under these circumstances the only possible course for me in describing Mr. Koebele's new species is to furnish a table of the genera which M. Guillebeau attributes to Australia arranged by his characters and apply to the species provisionally the names which that author employs, pointing out nevertheless that by this course I probably include under some of his names species which, if he had them before him, he would regard as requiring new generic names. The species described below, then, are divided into genera according to the following scheme, with the one exception indicated further on. I must remark however that the species which I refer to M. Guillebeau's sub-family *Olibromorphini* have the metasternum according to my observation protruding slightly beyond the intermediate coxæ, though not nearly so much protruding as the metasternum of those species which I refer to his *Olibrini*. I am disposed to think that this discrepancy is only a slight difference between his observation and mine because the species which have the metasternum short agree more or less

(some of them exactly) with the important tarsal characters that he indicates and because moreover if M. Guillebeau's description of the metasternum be held as rigidly accurate I should have to consider that I have not seen one of the *Olibromorphini* among all the numerous Australian *Phalacridæ* before me.

I cannot bring myself to think M. Guillebeau right in his treatment of *Litochrus;* I notice however an obscurity in his remarks which suggests the possibility of a printer's error. In his tabulation he distinguishes *Litochrus* from his new genus *Micromerus* by the former having the first joint of the posterior tarsi "very elongated," while the latter has it "two or three times as long as the second joint." Then he adds a note that in *Micromerus* the legs are probably less slender and the first joint of the tarsi less elongated than in *Litochrus* (which apparently he has not seen). But Erichson in characterising *Litochrus* merely says that the basal joint is longer than the second, and Lacordaire calls the second joint "a little" shorter than the first. This is a tangle which suggests the question whether in M. Guillebeau's note (quoted above) "less" may have been accidentally substituted for "more." I have in my collection an example from Tasmania which I have no doubt is *Litochrus brunneus*, Er., and its hind tarsi have their basal joint less than twice as long as their second joint. I have also some species from tropical Australia in which the basal joint is even more than three times as long as the second. It would not however be safe either to call these latter *Micromerus* or to give them a new name; consequently I must apply the name *Litochrus* to all the Australian *Olibrini* known to me.

A. Mesosternum visible only with the appearance of being a narrow scarcely prominent front margin to the metasternal lobe.
  B. Epistoma emarginate close to the eye.
    C. Metasternal lobe protruding beyond the intermediate coxæ (*Olibrini*).
      D. Basal joint of posterior tarsi very elongate ... *Litochrus*
      DD. Basal joint of posterior tarsi less elongate, but considerably longer than second joint ... *Micromerus*
    CC. Metasternal lobe less produced (according to M. Guillebeau not passing the intermediate coxæ) (*Olibromorphini*).
      D. Second joint of posterior tarsi much longer than basal joint... ... ... *Parasemus*
      (The other genera are not known to be Australian).
  BB. Epistoma not emarginate (*Phalacrini*).
    C. Elytra with a subsutural stria ... ... *Phalacrus*
    (No other genus recorded in Australia).
AA. Mesosternum well developed (*Eustilbini*).
  B. Apical joint of maxillary palpi not dilated; basal joint of hind tarsi not elongate ... ... *Phalacrinus*
  (No other genus recorded as Australian).

As explained above, I am obliged to refer to *Litochrus* provisionally, all the Australian species known to me presenting the characters of the group that M. Guillebeau has called "*Olibrini.*" Nevertheless three of them (the first three described below) might with some reason be separated generically from the rest on account of the great slenderness of their hind tarsi, the great elongation of the basal joint of the same, and the greater projection beyond the intermediate coxæ of their metasternal lobe; the basal joint of their hind tarsi is longer than all the other joints together. None of the species previously described by me as *Litochri* exhibit these characters, but two of them (*L. suturellus* and *lateralis*) appear as noted below to fall into M. Guillebeau's new genus *Parasemus.*

L. coloratus, sp. nov. Ovalis; nitidus; rufus, prothoracis basa (anguste) elytrisque (apice sanguineo excepto) nigris; supri fere lævi (elytrorum stria suturali antice abbreviata excepta); metasterno medio sparsim setoso; tarsorum posticorum articulo basali quam ceteri conjuncti longiori. Long., $1\frac{3}{10}$ l.; lat., $\frac{7}{10}$ l.

The conspicuous coloring of this pretty species renders it easily recognisable. It is all but devoid of sculpture even near the apex (the sutural stria excepted). There are however some faint transverse scratches on the elytra visible only from certain points of view.

N. Queensland; taken by Mr. Koebele near Cairns.

L. pulchellus, sp. nov. Ovalis; nitidus; supra rufus, capite postice prothoraceque (lateribus exceptis) obscuris, elytris (lateribus anguste apice late et macula communi magna transversa rufis exceptis) nigris; capite prothoraceque sat lævibus; elytris fere lævibus (stria suturali antice abbreviata excepta) sed apicem versus obsoletissime punctulato-striatis; corpore subtus læte brunneo; metasterno medio rufo, sparsim punctulato, vix manifeste setoso (? exempli typici abraso); tarsorum posticorum articulo basali quam ceteri conjuncti longiori. Long., $\frac{9}{10}$—$1\frac{2}{5}$ l.; lat., $\frac{1}{2}$—$\frac{3}{5}$ l.

The conspicuous elytral markings render this also a readily recognisable species. The elytra may be thus described:—Red, bearing a large common black ring which touches the base, nearly touches the lateral margins and is considerably separated from the apex. The enclosed central space (owing to irregularity in the shape of the black ring) presents the appearance of two roundish spots confluent for some distance along the suture. The elytra are not marked with transverse scratches.

N. Queensland; taken by Mr. Koebele near Cairns.

L. noteroides, sp. nov. Ovalis; nitidissimus; totus pallide brunneo-testaceus; supra fere lævis, elytrorum stria suturali leviter impressa antice abbreviata; tarsorum posticorum articulo basali quam ceteri conjuncti longiori. Long., 1 l.; lat., $\frac{3}{5}$ l.

This species bears a certain resemblance in outline to a *Dytiscid* of the genus *Noterus*. It is smaller than *L. coloratus* and very different in color from both the preceding species. Its elytra show no trace of the transverse scratches that are characteristic of *L. coloratus*.

N. Queensland; taken by Mr. Koebele near Cairns.

L. Koebelei, sp. nov. Sat late ovalis; nitidus; testaceus; capite prothoraceque fere lævibus; elytris sat distincte punctulato-striatis, striis basin versus obsoletis et vix perspicue punctulatis, interstitiis subalutaceis et puncturis sparsissimis impressis stria suturali postice sat fortiter impressa; antennarum clava sat brevi sat lata. Long., 1 l. (vix); lat., $\frac{3}{5}$ l.

The uniform testaceous color, rather broad form, compact antennal club and distinct elytral sculpture of this species combine to render it easily recognisable.

N.S. Wales; taken by Mr. Koebele on the Blue Mountains.

L. tinctus, sp. nov. Ovalis; nitidus; testaceus, elytris basin versus indeterminate lineis macularibus fuscis notatis; capite prothoraceque subtilissime crebre sat distincte punctulatis; elytris ut prothorax punctulatis et puncturis paullo majoribus (his obsolete seriatim impressis et basin versus vix perspicuis) impressis, stria suturali postice minus fortiter impressa; antennarum clava sat brevi sat lata. Long., $1\frac{1}{10}$—$1\frac{1}{2}$ l.; lat., $\frac{7}{10}$—$\frac{9}{10}$ l.

This species seems to be near *Micromerus amabilis*, Guilleb., but is considerably larger and also differs *inter alia* by the line-like fuscous marks with which the basal part of the elytra is variegated. These marks seem to be always present though varying somewhat in intensity and never very sharply defined.

N. Queensland; taken by Mr. Koebele near Cairns.

L. major, Blackb. Ovalis; nitidus; niger subiridescens, capite antice prothoracis marginibus omnibus elytrorum lateribus (anguste) corpore subtus antennis palpis pedibusque testaceo-rufis; capite prothoraceque crebre subtiliter punctulatis; elytris seriatim subfortiter punctulatis, interstitiis dupliciter (sc. sparsius subtiliter et sparsissime subfortiter) punctulatis, stria suturali minus fortiter impressa; antennarum clava modica; hujus articulo basali leviter 2° sat fortiter transversis, apicali quam præcedens parum longiori. Long., $1\frac{4}{5}$ l.; lat., $1\frac{1}{10}$ l.

This species is notable for its large size. Its coloring also distinguishes it from all its Australian allies. I originally mentioned it as possibly a variety of the species I described as *Litochrus lateralis*, but it has good structural characters as will be seen by reference to my remarks on that species.

S. Australia.

The genus *Litochrus* (to which for reasons specified above I refer all the Australian *Phalacridæ* known to me having the hind tarsi elongated in proportion to the anterior tarsi and their basal joint considerably longer than the second joint) is now becoming so numerous that a tabular statement of the characters of its species seems called for.

A. Basal joint of hind tarsi longer than all the other joints together.
  B. Elytra without transverse sculpture.
    C. Color entirely testaceous ... ... *noteroides*, Blackb.
    CC. Elytra with well-defined markings ... *pulchellus*, Blackb.
  BB. Elytra with transverse scratch-like sculpture *coloratus*, Blackb.
AA. Basal joint of hind tarsi shorter than all the other joints together.
  B. Elytra with defined markings.
    C. Elytra black with a common red spot ... *maculatus*, Blackb.
    CC. Elytra pale testaceous with black markings.
      D. Elytra with decided traces of numerous striæ ... ... *læticulus*, Blackb.
      DD. Elytra with only the sutural stria distinct ... ... *consors*, Blackb.
  BB. Elytra without defined markings.
    C. The largest punctures of the elytra are on alternate interstices ... ... *alternans*, Blackb.
    CC. Elytral puncturation not as "C."
      D. The elytral sculpture consists of rows of punctures,—not distinct striæ (except the sutural stria).
        E. These rows are almost entire and consist of strong punctures ... ... *major*, Blackb.
        EE. The rows fail in the anterior quarter of the elytra.
          F. The punctures in the rows, though fine, are strongly impressed (especially behind the middle)... ... *brunneus*, Er.
          FF. The punctures in the rows very faintly impressed throughout.
            G. Elytra piceous or reddish.
              H. Antennæ entirely testaceous ... *sydneyensis*, Blackb.
              HH. Antennæ with their club dark *frigidus*, Blackb.
            GG. Elytra testaceous.
              H. Form oval (elytra with indistinct short fuscous lines) ... ... *tinctus*, Blackb.
              HH. Form subhemispheric (Micromerus) ... ... *amabilis*, Guilleb.
      DD. Elytral sculpture not consisting of mere rows of punctures.
        E. Elytra with distinct punctulate striæ *Koebelei*, Blackb.
        EE. Elytra with faint impunctulate striæ *Palmerstoni*, Blackb.

PARASEMUS.

To the best of my knowledge no formal diagnosis of this genus has been published. The following characters are to be inferred from its place in two tabulations (Ann. Soc. Ent. Fr. 1894) :— Palpi of ordinary length, intermediate coxæ widely separated, mesosternum appearing only as the reflexed margin of the metasternal lobe, clypeus emarginate close to the eye and rounded at the apex, metasternal lobe not passing the intermediate coxæ, prosternal lobe not passing the front coxæ, antennal club three-jointed, second joint of posterior tarsi two or three times as long as basal joint, apical joint of maxillary palpi cylindric, a single subsutural stria, basal two joints of posterior tarsi not soldered together, posterior tibiæ obliquely truncate at the apex, form subhemispheric.

I have in my collection a number of species which must either be referred to this genus or be regarded as representing a new genus closely allied to it. They all agree more or less perfectly with the diagnosis of *Parasemus* that I have given above, their variations from it being in respect of characters that need not be regarded as generic ; thus the basal joint of the hind tarsi is in every instance notably shorter than, though in some instances it is more than *half* as long as, the second joint ; and the form of the body is by no means constantly subhemispheric, but this latter character (*i.e.*, the form of the body) is I think manifestly only specific. The character that I feel most doubtful about is "basal two joints of hind tarsi not soldered together." I am not sure that I understand this expression. In the insects before me the basal two joints are very closely connected and the suture (though perfectly manifest under a microscope) is very fine, but the two joints are certainly distinct from each other. A remarkable character common in a greater or less degree to them all consists in the compression and dilatation of the femora —especially the four anterior ones. These four might be called "subcircular" being almost as wide as long, the hinder margin of the intermediate being however not evenly rounded but feebly angular in the middle ; in repose the tibiæ are almost hidden under these flat plate-like femora only their apex protruding. As M. Guillebeau does not refer to the femora in *Parasemus* this character does not help me to determine whether my specimens are *Parasemi*.

I find that two species which I have previously referred to *Litochrus* must take their place among these present insects, viz., *L. suturellus*, Blackb., and *L. lateralis*, Blackb. At the time I described them the suture between the basal two joints of the hind tarsi escaped my notice and I mistook the two joints for a single one. I have now placed a hind tarsus of all the species in

my collection under a microscope so as to make sure of correctly ascertaining the structure. The two species which I described (Tr. Roy. Soc. S.A. 1892, p. 98) as probably members of a new genus near *Litochrus* and which I called *L.* (?) *alpicola* and *L.* (?) *uniformis* must also stand here and I think that which I called *Olibrus victoriensis* should be added.

P. torridus, sp. nov. Late ovalis; nitidus; supra piceus plus minusve rufescens; subtus, cum antennis palpis pedibusque, brunneo-testaceus; capite prothoraceque fere lævibus, elytris parte prope basin lævi excepta seriatim distincte punctulatis, puncturis in seriebus subtilibus et crebre dispositis, stria suturali (hac pone elytrorum medium incipienti) bene impressa, interstitiis vix manifeste punctulatis; antennarum clava sat elongata; hujus articulis 1° 2° que sat transversis intus quam extus multo magis dilatatis, articulo apicali quam præcedentes 2 conjuncti vix breviori. Long., 1 l.; lat., $\frac{4}{5}$ l.

This species bears considerable resemblance to *P.* (*Litochrus*) *suturellus*, Blackb., from which it differs *inter alia* by the large basal space devoid of sculpture on the elytra and by the sutural stria being altogether effaced on more than the anterior half of the elytra; also by the interstices of the elytral striæ being almost impunctulate, only the one or two nearest to the suture bearing any defined punctures.

N. Queensland; taken by Mr. Koebele near Cairns.

P. discoideus, sp. nov. Late ovalis; nitidus; supra rufo-piceus, prothoracis lateribus et elytrorum macula magna communi indeterminata basin attingenti multo dilutioribus; subtus cum antennis palpis pedibusque brunneo-testaceus; capite prothorace que fere lævibus, elytris (parte magna prope basin lævi excepta) seriatim distincte punctulatis, puncturis in seriebus subtilibus sat sparsim dispositis, stria suturali (hac pone elytrorum medium incipienti) sat bene impressa, interstitiis vix manifeste punctulatis; antennarum clava sat elongata; hujus articulis ut præcedentis. Long., $\frac{4}{5}$ l.; lat., $\frac{3}{5}$ l.

Smaller than the preceding and differently colored, also with the punctures in the elytral series a little finer and considerably less closely placed; the elytra are of a dark red or piceous color, the whole disc being occupied by a common somewhat heart-shaped blotch of a testaceous red color; this blotch is not sharply defined, touches the base, extends to within a short distance of the apex and spreads out laterally so as to be separated from the margin on either side by a dark space equal to about one-third of the width of an elytron. In certain lights the elytra of this

species show a rather distinct blue iridescence which is scarcely discernible in *P. torridus*.

N. Queensland; taken by Mr. Koebele near Cairns.

P. doctus, sp. nov. Sat late ovalis; sat nitidus; capite prothoraceque rufis (hujus disco infuscato); elytris piceo-nigris, margine laterali (anguste) et macula communi discoidali bene determinata litteram V (late apertam) simulanti rufis; corpore subtus antennis palpis pedibusque sordide testaceis; capite prothoraceque sparsim sat distincte punctulatis; elytris (parte angusta prope basin lævi excepta) seriatim distincte punctulatis, puncturis in seriebus sat subtilibus sat crebre dispositis, stria suturali (hac longe ante elytrorum medium incipienti) sat fortiter impressa, interstitiis confertim subtilissime punctulatis; antennarum clava ut *P. torridi*. Long., $1\frac{1}{10}$ l.; lat., $\frac{4}{5}$ l.

This species is easily recognisable by the sharply defined red mark resembling a widely open V on the disc of the almost black elytra.

N.S. Wales; taken by Mr. Koebele on the Blue Mountains.

P. comes, sp. nov. Late ovalis; nitidus; supra piceo-niger, capite prothoracis lateribus elytrorum lateribus (anguste) et macula magna communi discoidali cordiformi bene determinata (hac marginem nusquam attingenti) rufis; subtus cum antennis palpis pedibusque testaceus vel brunneo-testaceus, metasterno medio sanguineo; capite prothoraceque sparsim sat distincte punctulatis; elytris seriatim distincte (prope basin vix perspicue) punctulatis, puncturis in seriebus sat subtilibus sat crebre dispositis, stria suturali paullo ante medium incipienti minus fortiter impressa, interstitiis sat distincte punctulatis; antennarum clava ut *P. torridi*. Long., $1\frac{3}{10}$ l.; lat., 1 l.

Resembles the preceding but apparently a good species; it differs chiefly by its larger size, broader build, and the fainter impression of the sutural stria which commences evidently further from the suture; also the red mark on its elytra is of very different form. Resembles also in general appearance *Litochrus maculatus*, Blackb.

N. Queensland; taken by Mr. Koebele near Cairns.

P. modestus, sp. nov. Late ovalis, postice subacuminatus; nitidus; totus brunneo-testaceus; capite prothoraceque fere lævibus, elytris (parte magna prope basin lævi excepta) seriatim distincte punctulatis, pone scutellum subgibbosis, puncturis in seriebus sat subtilibus minus crebre dispositis, stria suturali paullo ante medium incipienti sat fortiter impressa, interstitiis (illis versus suturam exceptis) vix per-

spicue punctulatis; antennarum clara ut *P. torridi.* Long., $\frac{4}{5}$ l.; lat., $\frac{2}{5}$ l.

Easily distinguishable by its entirely uniform pale brownish-testaceous color and extremely nitid appearance.

N. Queensland; taken by Mr. Koebele near Cairns.

P. obsoletus, sp. nov. Minus late ovalis; nitidus; supra fusco-piceus (nonnullorum exemplorum lateribus dilutioribus); subtus cum antennis palpis pedibusque brunneo-testaceus; capite prothoraceque vix perspicue punctulatis; elytris (parte magna prope basin lævi excepta) seriatim distincte punctulatis, pone scutellum subgibbosis; puncturis in seriebus subtilibus minus crebre dispositis, stria suturali paullo ante medium incipienti sat fortiter impressa, interstitiis vix perspicue punctulatis; antennarum clava ut *P. torridi.* Long., $\frac{4}{5}$ l.; lat., $\frac{1}{2}$ l.

This species is much like the preceding, apart from its very different color,—but when carefully examined its form is seen to be less broadly oval, the puncturation of its elytra considerably finer and its femora much less broadly dilated.

N. Queensland; taken by Mr. Koebele near Cairns.

P. internatus, sp. nov. Sat late ovalis; nitidus; supra piceo-niger, prothoracis lateribus obscure rufescentibus, subtus cum antennis palpis pedibusque rufo-testaceis; capite prothoraceque crebre subtilissime (vix perspicue) punctulatis, elytris (parte sat magna prope basin sublævi excepta) seriatim minus distincte punctulatis, puncturis in seriebus subtilissimis sat crebre dispositis, stria suturali sat longe ante medium incipienti, minus fortiter impressa, interstitiis subtiliter alutaceis; antennarum clava ut *P. torridi.* Long., $\frac{9}{10}$ l.; lat., $\frac{3}{5}$ l.

A species of very dark color on the upper surface, with the punctures in the elytral series excessively fine and faintly impressed. It is closely allied to the two preceding and best distinguished, I think, by inspecting it from the side, when the outline curve of its upper surface is seen to be much less curved (*i.e.*, part of a much larger circle) and to be *even*, whereas in the other two there is an evident unevenness of the curve due to a slight gibbosity a little distance behind the scutellum, the height of the elytra at that point being much greater than at the middle of their length.

S. Australia; Petersburg.

The following table shows the distinctive characters of the described Australian *Parasemi.* In this genus, it will be remembered, I include all the Australian *Phalacridæ* known to me having the characters of the *Olibromorphini* (as they are stated

above) and also having the second joint of the hind tarsi considerably longer than the basal joint.

A. Elytra without sharply defined markings.
  B. Form oval.
    C. Discoidal interstices of elytra with very inconspicuous (if any) puncturation.
      D. Sutural stria extending well into the front half of the elytra.
        E. The punctures in the elytral series more or less closely placed.
          F. Color of the upper surface more or less piceous or reddish-piceous.
            G. The elytral rows of punctures very fine throughout, and scarcely traceable in basal one-fifth of elytra.
              H. Elytra sub-gibbous behind the scutellum ... ... *obsoletus*, Blackb.
              HH. Elytra not sub-gibbous behind the scutellum ... ... *internatus*, Blackb.
            GG. The elytral rows of punctures much stronger (almost as in the European *Phalacrus caricis*, Sturm) and continued nearer base ... *suturellus*, Blackb.
          FF. Color uniformly very pale testaceous *modestus*, Blackb.
        EE. The punctures in the elytral series very fine and much more sparsely placed *discoideus*, Blackb.
      DD. Sutural stria scarcely reaching into the front half of the elytra ... ... *torridus*, Blackb.
    CC. Discoidal interstices of elytra with sparse well-defined puncturation about as strong as in the European *Phalacrus caricis*, Sturm.
      D. Elytra black ... ... *lateralis*, Blackb.
      DD. Elytra red ... ... *victoriensis*, Blackb.
  BB. Form subhemispheric.
    C. General color black ... ... *Grovellei*, Guillb.
    CC. General color ferruginous ... ... *uniformis*, Blackb.
  BBB. Elytra very broad at the shoulders and strongly acuminate behind ... ... *Alpicola*, Blackb.
AA. Elytra with sharply defined marking.
  B. The marking consists of a common heart-shaped spot ... ... *comes*, Blackb.
  BB. The marking resembles the letter V ... *doctus*, Blackb.

PHALACRINUS.

P. notabilis, sp. nov. Subrotundus, postice sat acuminatus; nitidus; supra piceo-niger, capite antice rufescenti, prothoracis (late) et elytrorum (anguste) lateribus rufis; corpore subtus antennis palpis pedibusque brunneo-testaceis, antennarum clava infuscata; capite prothoraceque subtilissime minus confertim punctulatis; elytris punctulato-striatis, striis suturam versus subtiliter latera versus fortiter impressis interstitiis distincte subtiliter nec crebre punctulatis; antennarum articulo basali valde dilatato, articulo

10° quam 9us sat breviori, apicali quam præcedentes 2 conjuncti vix breviori.

Var.? *dilutior*. Pallide brunneo-testaceus, elytris apicem versus picescentibus. Long., $1\frac{11}{10}$ l.; lat., 1 l.

Resembles *P. obtusus*, Blackb., in shape, but differs from it and from the other previously described species *inter alia* by the very deeply impressed lateral striæ of its elytra.

N. Queensland; taken by Mr. Koebele near Cairns.

P. comis, sp. nov. Subrotundus, postice sat acuminatus; nitidus; brunneo-testaceus, hic illic indeterminate obscurior; capite prothoraceque subtilissime sat sparsim punctulatis; elytris distincte subtiliter striatis, striis suturam versus subtiliter latera versus multo minus subtiliter punctulatis, interstitiis distincte minus crebre punctulatis; antennarum articulo basali sat dilatato, apicali quam præcedentes 2 conjuncti sat breviori. Long., $1\frac{1}{10}$ l. (vix); lat., $\frac{9}{10}$ l.

Resembles *P. obtusus*, Blackb., in shape and elytral striation but differs in the very well defined puncturation of its elytral striæ. *P. rotundus*, Blackb., has punctulate striæ but its striæ (especially the lateral ones) are very much more *finely* punctured and its shape is very different, being shorter and evidently more nearly circular.

Victoria; sent to me by Mr. French.

PECTINICORNES.

CERATOGNATHUS.

C. Gilesi, sp. nov. (Mas.) Elongatus, sat parallelus; crasse rugulose (in prothorace inæqualiter) punctulatis; niger, squamis adpressis aurantiacis sparsim vestitus; capite supra tuberculo mediano (hoc ad apicem vix bifido) instructo; mandibulis quam caput vix longioribus, in medio obtuse leviter auriculatis, ad apicem trifidis (lobo intermedio quam ceteri longiori); prothorace quam longiori fere dimidia parte latiori, antice sat angustato, longitudinaliter profunde sulcato; elytris irregulariter costatis, costis alternis quam ceteræ majoribus.

Feminæ mandibulis brevibus nec auriculatis. Long. (mands. incl.), 6—$6\frac{1}{4}$ l.

A very distinct species. Compared with *C. niger*, Westw., it differs by the form of the mandibles which are trifid at the apex (the three lobes all pointing in a direction continuing the length of the mandible) and in the male have a small obtuse elevation about the middle of their length (this elevation is much smaller and further from the base than the elevation on the mandibles of *C. Frogatti*, Blackb.); also differs from *C. niger* by its coarser

and less evenly distributed sculpture which is so disposed on the prothorax as to leave some large nitid protuberant spaces devoid of punctures, also by its prothorax being much less strongly transverse and being very evidently narrowed in front, also by there being only one frontal tubercle and the prothorax being deeply channelled down the middle, also by the elytra having about ten costæ, of which the alternate ones are the stronger (the somewhat coarse puncturation of the elytra not being interrupted by the costæ these latter are less conspicuous than they would be otherwise). The totally different sculpture of the prothorax *inter alia* distinguishes this species from *C. Westwoodi*, Thoms.

Victoria; in mountainous parts; taken by Mr. E. Giles.

CRYPTOPHAGIDÆ.

TELMATOPHILUS.

The following four species, although not very closely allied *as* species, seem to present no structural differences inconsistent with their being placed together generically. They are all subpentamerous clavicorns, and my own inclination was to refer them or at any rate most of them to the *Erotylidæ*. Feeling, however, some hesitation as so their true place I forwarded examples of the first described to my friend Dr. Sharp, of Cambridge, to whose obliging readiness in giving me his judgment I was already under many obligations. Dr. Sharp tells me that the specimens I submitted to him may certainly be treated as congeneric with the N. Zealand *Telmatophilus nitens*, Shp. He, however, points out that in this determination he does not differ much from my view of the matter as he regards the *Erotylidæ* and *Cryptophagidæ* as incapable of satisfactory distinction. There is no higher authority than Dr. Sharp, as all Coleopterists know; I consider myself very fortunate in having been able to obtain his opinion.

T. Sharpi, sp. nov. Oblongus; modice convexus; nitidus; setis subtilibus singulis minus elongatis e puncturis singulis orientibus vestitus; rufo-testaceus, capite prothorace et elytrorum plagis sat magnis nonnullis plus minusve infuscatis, exemplorum nonnullorum antennarum clava paullo infuscata; capite convexo sat æquali, cum prothorace sat fortiter vix crebre punctulato; hoc sat fortiter tranverso, antice vix angustato, ad basin late sublobato, ante basin transversim fortiter sulcato, lateribus sat arcuatis ante basin manifeste sinuatis, angulis posticis acute rectis; elytris leviter (striis lateralibus fortiter impressis exceptis) striatis, seriatim punctulatis, puncturis in striis crebris, interstitiis

lævibus (3° 5° 7° que sparsim seriatim punctulatis exceptis) antennis quam corporis dimidium brevioribus, articulo basali suborbiculari, 2° multo minori moniliformi, 3° quam 2us sat longiori, 4° ut 2us, 5° paullo longiori, 6°—8° ut 2us, 9° 10° que transversis sat latis, 11° quam 10us paullo longiori obovato; prosterno inter coxas sat lato utrinque carinato, postice producto, ad apicem truncato; oculis prominulis fortiter granulatis; metasterno ad latera grosse (in medio cum abdomine magis subtiliter) punctulato. Long., $1\frac{1}{5}$ l.; lat., $\frac{2}{5}$ l.

The infuscate blotches on the elytra are variable; in a well-marked specimen they consist of a large transversely quadrate or somewhat triangular common blotch at the base, a broad more or less straight median fascia and a large common apical blotch. In some examples the median fascia is dilated forward near the lateral margin, in others the median fascia is interrupted at the suture, and in others it does not reach the lateral margins. In some examples the dark markings on the elytra are nearly black and in others very little darker than the rest of the surface. The elytra of very dark examples are nearly black with a narrow pale fascia from either shoulder obliquely running towards the suture, and a pale spot on each elytron near the apex.

N. Queensland; taken by Mr. Koebele near Cairns.

T. Koebelei, sp. nov. Præcedenti (*T. Sharpi*) valde affinis; antennarum articulo 5° quam 4us 6us que haud perspicue longiori; prothoracis lateribus manifeste minus arcuatis; elytris (striis lateralibus exceptis) haud striatis, puncturis in seriebus multo minus crebre dispositis. Long., $1\frac{1}{5}$ l.; lat., $\frac{2}{5}$ l.

In addition to the structural characters set forth above this species differs from the preceding in the markings of its elytra, there being on each elytron a longitudinal prolongation of the median dark mark connecting the latter with the hind external corner of the basal blotch; this is not the case with any variety that I have seen of *T Sharpi*.

Queensland; taken by Mr. Koebele.

T. cairnsensis, sp. nov. *T. Sharpi* valde affinis; prothorace antice nullo modo angustato, minus crebre punctulato, lateribus fere rectis, elytris ut *T. Koebelei*. Long., $1\frac{3}{10}$ l.; lat., $\frac{1}{2}$ l. (vix).

Larger and of slightly wider build than *T. Sharpi* and with a very differently shaped prothorax. The markings differ in the basal and apical blotches of the elytra being very small, but as I have only seen a single example of this insect it is possible that this may be a mere variation.

N. Queensland; taken by Mr. Koebele near Cairns.

T. breviformis, sp. nov. *T. Sharpi* valde affinis; multo minus elongatus, magis crebre setulosus, antennarum articulo 5° quam 4us vix longiori, prothoracis lateribus paullo ante basin subangulatis hinc ad basin fortiter convergentibus, elytrorum interstitiis omnibus punctulatis. Long., 1 l.; lat., $\frac{2}{5}$ l.

♂ The dark markings of this species are much like those of some specimens of *T. Sharpi*; they are however much reduced in size and intensity, so that each elytron is of a yellowish brown color with a dark patch about the scutellum an elongate longitudinal dark patch on the disc and a small apical dark patch. As each puncture on this, and all the preceding three, species bears a fine seta the interstices being much more punctulate involves the general surface being much more setulose.

N. Queensland; taken by Mr. Koebele.

T. stygius, sp. nov. Anguste oblongus; sat parallelus; sat convexus; nitidus; setis subtilibus minus perspicuis e puncturis singulis orientibus vestitus; supra niger; subtus piceus in medio rufescens; antennis pedibusque picescentibus, tarsis dilutioribus; capite prothoraceque fortiter vix crebre punctulatis; hoc sat transverso antice haud angustato, ad basin late sublobato, ante basin transversim fortiter sulcato, lateribus sat rectis; elytris vix (striis lateralibus exceptis) striatis, fortiter sat crebre seriatim punctulatis, interstitiis alternis sparsim vix perspicue punctulatis; antennis fere ut *T. Sharpi* sed articulo 5° quam 4us parum longiori; oculis et corpore subtus fere ut *T. Sharpi* sed metasterno medio et abdomine magis fortiter punctulatis. Long., $1\frac{1}{5}$ l.; lat., $\frac{2}{5}$ l. (vix).

Its black color and parallel build render this species easy to recognise.

N. Queensland; taken by Mr. Koebele.

T. singularis, sp. nov. Oblongus; sat convexus; sat nitidus; setis subtilibus e puncturis singulis orientibus vestitus; rufo-brunneus, antennarum clava infuscata; capite prothoraceque fortiter vix crebre punctulatis; hoc transverso, quam elytra sat angustiori, antice parum angustato, ad basin haud lobato, ante basin vix perspicue transversim sulcato, lateribus sat rotundatis crenulatis; elytris leviter (latera versus magis fortiter) striatis, striis crebre fortiter (interstitiis sparsissime) punctulatis; antennis fere ut *T. Sharpi* sed paullo brevioribus, articulo 5° quam 4us vix longiori; corpore subtus fere ut *T. Sharpi*; oculis sat fortiter granulatis, sed quam *T. Sharpi* minus grosse. Long., 1 l.; lat., $\frac{2}{5}$ l.

Differing much from the preceding in facies (owing chiefly to its prothorax being narrower in comparison with the elytra and

being neither lobed nor strongly sulcate at the base), this species nevertheless seems less aberrant in *Telmatophilus* than they do, especially in respect of its less coarsely granulated eyes [these organs in the preceding are far more coarsely granulated than in European *Telmatophili* (*e.g.*, *T. caricis*, Oliv.)] and its tarsi of which the basal three joints are (as in *T. caricis*) a little longer and less closely packed together than in *T. Sharpi*, &c. It may be noted that none of the above species can be placed in the Australian genus *Cnecosa* which Mr. Pascoe associated with *Telmatophilus*, and from which *inter alia* they differ widely in the structure of their palpi.

N. Queensland; taken by Mr. Koebele.

LAMELLICORNES.

EUPŒCILA.

E. balteata, Vollenh. I have received from Mr. French examples which seem to agree well with the description and figure of this species. Mr. French reports them as taken in N. Queensland. It should be noted that the present insect does not appertain to *Eupœcila* as limited by Dr. Kraatz, but is I think clearly congeneric with *Schizorhina atripennis*, Macl., which Dr. Kraatz somewhat hesitatingly assigns to *Dilochrosis*.

EUCNEMIDÆ.

FORNAX.

F. coloratus, sp. nov. Sat nitidus; rufus, antennis (basi excepta) capite postice elytrisque (fascia lata postmediana excepta) nigris; pube brevi (hac in prothorace aurea in elytris nigra) densim vestitus; capite sat crebre (prothorace minus crebre, elytris sparsim) minus fortiter punctulatis; capite inter oculos subplanato in parte mediana leviter impresso, haud manifeste carinato; antennis quam prothorax longioribus, articulo 3° quam 2us plus quam duplo (quam 4us paullo) longiori; prothorace sat transverso, antice sat angustato, angulis posticis (superne visis) sat acutis, basi 4-impressa; elytris in partibus anticis duabus parum (apicem versus magis fortiter) angustatis, sat evidenter iridescentibus, vix manifeste (stria subsuturali excepta) striatis. Long., 6 l.; lat., $2\frac{1}{5}$ l.

Easily recognisable by its nitid, black, more or less iridescent elytra traversed immediately behind the middle by a broad testaceous red fascia. In M. de Bonvouloir's tabulation of *Fornax* [Ann. Soc. Ent. Fr. (4) X. part supp.] this fine species would find its place somewhere in the neighborhood of the Malayan *F. mirabilis*, Bonv., from which it differs *inter alia* by

its apical ventral segment not being acuminate and in the markings of its elytra.

N. Queensland; in the collection of Mr. French.

CURCULIONIDÆ.

CUBICORHYNCHUS.

C. taurus, sp. nov. Ovalis; postice abrupte declivis (fere perpendicularis); piceus, squamis fumicoloribus et aliis griseis intermixtis sat dense vestitus, capite confertim granulato, inter (sed fere pone) oculos granulis majoribus 2 instructo; rostro brevi crasso, cristis interocularibus subspiniformibus apice obtusis antrorsum plane directis insigni; prothorace modice transverso, sat crasse minus confertim granulato (vel fere tuberculato, granulis majoribus nonnullis latera versus in parte antica dispositis), linea subtili mediana impresso, lateribus sat æqualiter arcuatis, latitudine majori ante medium posita; elytris crasse nec profunde sulcato-foveatis, interstitiis angustis elevatis e granulis confertim positis formatis.

Maris tibiis posticis intus supra medium abrupte fortiter tumidis; metasterno postice et segmento ventrali basali sat profunde concavis; segmento ventrali apicali postice late rotundato.

Femina latet. Long. 5 l., lat., $2\frac{1}{5}$ l.

This species may be at once distinguished from its described congeners by the interocular crests (which usually resemble a prolongation hindward of the lateral margin of the rostrum) taking the form of short horn-like processes directed straight forward—*i.e.*, rising abruptly perpendicularly (but a little pointed outward) to the general surface. The setæ springing from the tubercles are of pale yellow color.

Lake Callabonna; taken by Mr. Zietz.

CATOCALEPHE (gen. nov. *Aterpidarum*).

Corpus convexum subparallelum setosum; rostrum modice elongatum, latum, depressum, ante basin gibbum, antice et in medio nitidum subglabrum sublæve, in partibus ceteris opacum rugulosum setosum; scrobes postmedianæ, infra rostrum directæ, antrorsum ut sulci laterales ad rostri apicem continuæ; scapus brevis, oculum haud attingens; funiculus 7-articulatus brevis crassus (articulo 1° quam ceteri paullo longiori), in clava adnatus; oculi parvi depressi subgrosse granulati; prothorax magnus transversim quadratus (parte antica summa angustata), quam elytra vix angustior lobis ocularibus fortiter spiniformibus; scutellum parvum; prosternum ante coxas sat elongatum; metasternum sat elongatum; coxæ anticæ contiguæ; pedes sat breves sat

robustæ; femora mutica; tibiæ flexuosæ, ad apicem bicalcaratæ, anticis extus crenulatis, posterioribus 4 externe fortiter denticulatis, posticarum corbulis cavernosis; tarsi lineares, unguiculis liberis simplicibus; abdominis segmentum 2um quam 3um 4um que conjuncta longius.

The species on which I found this genus is at once recognisable by the remarkable spiniform development of the ocular lobes. What are its affinities is a very difficult question. In general appearance it is remarkably like *Orichora* (figured by Mr. Pascoe Journ. Linn. Soc. X. t. 19, f. 3) but has nothing to do with it structurally. My inclination would be to associate it in the *Rhyparosomidæ* with *Mandalotus* (probably identical as I have already pointed out with *Dysostines*), but its comparatively long metasternum seems quite irreconcileable with such a place. I have therefore referred it to the tribe in which a strict observance of M. Lacordaire's tabulations would locate it and have associated it with the *Aterpides*. Certainly its rostrum is considerably like that of a *Rhinaria*, but some of the characters cited above (*e.g.*, the cavernous corbels of its hind tibiæ) are by no means suggestive of an *Aterpid*. Probably M. Lacordaire if it had been before him would have treated it as representing a distinct tribe. The peculiar scrobes of the rostrum call for special notice; a deep lateral sulcus runs from the apex of the rostrum hindward and somewhat behind the middle suddenly widens and is deflected to the under surface, the antennæ being inserted at the point of deflection.

C. minans, sp. nov. Convexa; sat parallela; sat brevis; picea, exemplorum nonnullorum pedibus elytrisque paullo rufescentibus; setis albidis subcrebre vestita; prothorace nitido, sat crebre sat fortiter nec rugulose (lateribus cum capite rugulose) punctulato, disco longitudinaliter anguste lævi subelevata; elytris minus nitidis, striatis, interstitiis sat crebre subgrosse granuloso-rugulosis; corpore subtus crebre squamoso-punctulato. Long. (rostr. incl.), $3—3\frac{3}{5}$ l.; lat., $1\frac{1}{5}—1\frac{2}{3}$ l.

Central Australia; taken by Mr. Zietz at Lake Callabonna.

PACHYURA.

P. minima, sp. nov. Suboblonga (postice latior); rufa, in parte vel tota picescens; supra squamis ochraceis vestita, his in capite prothoraceque 3-lineatim in elytris 3-fasciatim minus perspicue condensatis; subtus dense æqualiter albido-squamosa (nihilominus in abdominis segmentis singulis,—apicali excepto,—utrinque macula parva denudata); rostro nigro nitido, usque ad antennarum basin squamoso et longitudinaliter carinato, fere lævi, ad apicem sat dilatato;

antennis præter prothoracis basin paullo attingentibus, articulo 3° quam 1us paullo longiori; prothorace cum elytris sat crebre granuloso-punctulato, transverso, antice angustato, lateribus leviter rotundatis; elytris obsolete striatis, ad apicem rotundatis, femoribus inermibus. Long. (rostr. incl.), 2—3 l.; lat., $\frac{3}{5}$—1 (vix) l.

I cannot ascertain that this extremely common little species has ever been described. I have little doubt that it is the insect named *P. australis* (but not described) by Mr. Hope as the type of the genus *Pachyura* and that the insect which Schönherr described as *P. australis*, Hope, was wrongly identified; the latter I have not seen from S. Australia whereas this little species is plentiful in the localities from which Hope obtained most of his insects. *P. minima* is a variable insect, its derm (including the legs and antennæ) ranging in color from red to pitchy black and the squamosity (which is coarse and seta-like) from pale to bright ochraceous. The squamosity is vaguely and sparsely dispersed over the whole upper surface except the apical part of the rostrum and in places is denser than elsewhere, this condensation of scales causing the appearance of an ill-defined pattern which consists of three lines running hindward from the level of the eyes to the base of the prothorax and three elytral fasciæ (subbasal, median, and subapical). It is however only in well preserved specimens that the elytral fasciæ are all distinguishable; average specimens give the appearance of elytra somewhat evenly squamose except in there being a semi-denuded space before and behind the middle. The sexual differences are not very marked; the males however are smaller and less robust than the females, and the rostrum in the former sex is slightly shorter than (while in the latter it is as long as) the head. The small size of this species is in itself a sufficient character to distinguish it from others previously described.

S. Australia; Victoria; N.S. Wales.

LONGICORNES.

PACHYDISSUS.

P. Frenchi, sp. nov. Piceus; pube sericea læte argentea densa interrupte vestitus; prothorace ad latera obtuse tumido, supra crasse ruguloso; elytris ad apicem oblique truncatis, partis truncatæ angulis spiniformibus; oculis supra modice approximatis, subtus late distantibus; spatio inter oculos subtus capillis subtilibus elongatis dense vestito, sat crebre punctulato, carina obtusa insigni transversim arcuata instructo; antennarum articulo basali crasse nec profunde ruguloso.

Maris antennis quam corpus multo longioribus; articulo 1° valde dilatato prothorace nullo modo attingenti, 2° brevi, 3° clavato quam præcedentes 2 conjuncti parum longiori, 4° clavato quam 3us paullo breviori, 5° leviter clavato 3° longitudine sat æquali, 6° sat gracili filiformi quam 5us dimidio longiori, 7° 8° que quam 6us manifeste longioribus supra longitudinaliter carinatis, ceteris (exempli typici) carentibus; segmento ventrali apicali ad apicem rotundato-truncato. Long., 17 l.; lat., $4\frac{1}{5}$ l.

Feminæ antennis quam corpus subbrevioribus filiformibus. Long., 16 l.

At once distinguishable from its described congeners by the beautiful bright silvery pubescence with which its upper surface is patchily clothed. It is also remarkable for the coarse but not very deep rugulosity of the basal joint of its antennæ which runs in transverse wrinkles. The underside of its head is like that of *P. picipennis*, Germ., except that the space between the eyes is divided from the space immediately in front of it (not by a sulcus but) by a curved carina.

N. Queensland.

NEOSTENUS.

N. spinipennis, sp. nov. (Mas.) Brunneo-piceus, antennis obscurioribus, elytris (marginibus anguste piceis exceptis) dilutioribus; antennis quam corpus paullo longioribus, articulis 5—10 quam *N. Saundersi* paullo magis fortiter serratis; prothorace quam longiori vix (quam *N. Saundersi* minus perspicue) latiori; elytris ad apicem suturalem spina valida (quam tarsorum articulus 3us vix breviori) armatis, ad latera profunde (quam *N. Saundersi* magis fortiter) excavatis, costis obsoletis (quam *N. Saundersi* multo minus distinctis). Long., 13 l.; lat., $3\frac{4}{5}$ l.

Very like *N. Saundersi*, Pasc., but easily distinguishable by the characters cited above, especially by the long stout spine at the sutural apex of the elytra.

Central Australia; taken by Mr. Zietz near Lake Callabonna.

PRAONETHA.

P. bimaculata, sp. nov. (Fem. ?) Fusca, dense fusco-pubescens, prothoracis maculis 2 magnis basalibus et elytrorum notula communi postmediana late V-formi piceis, spatio elytrorum inter suturam et costam ad suturam proximam in parte tertia postica longe testaceo-hirsuto; capite prothoraceque sat sparsim subtilius, elytris basin versus sparsim magis fortiter postice minus perspicue, punctulatis; prothorace antice et postice transversim impresso, modice transverso, supra minus inæquali haud tuberculato, lateribus sat arcuatis;

elytris postice haud abrupte declivibus, ad apicem oblique truncatis, in disco tricostatis (et quoque costa 4ª exteriori leviter elevata, et 5ª versus apicem fere ut tuberculus elongatus manifesta), costa ad suturam proxima (ita ut cristæ 3 fasciculatæ appareant) divisa, disco granulis nonnullis parvis ornato; segmento ventrali apicali in medio nigro, linea subtili longitudinali mediana impresso; antennis quam corpus paullo brevioribus. Long., 6 l.; lat., $2\frac{2}{5}$ l.

This species belongs to Mr. Pascoe's seventh section of *Praonetha* (Tr. Ent. Soc. Lond. [3] III., pp. 180, &c.). It seems to be very distinct from all previously described species; the long testaceous pilosity clothing the sutural region in its hinder portion is a notable character; this pilosity is particularly conspicuous at the commencement of the posterior declivity where it is laid almost flat and directed outward as though combed from the suture over the hindmost of the crests. [A specimen of this species recently received from Mr. Cowley and taken by him near Cairns is somewhat smaller than the type and has snowy-white pubescence clothing a common space on the elytra a little behind the scutellum.]

N. Queensland.

CAIRNSIA (gen. nov. *Niphonidarum*).

Mas. Mandibulæ modicæ; caput breve, inter antennas parum concavum; antennæ quam corpus paullo longiores, subtus sparsim ciliatæ, articulo basali modico sat anguste piriformi, 3° quam 1ᵘˢ duplo longiori, 4° quam 3ᵘˢ vix breviori, ceteris ex ordine brevioribus; oculi fere divisi, fortiter granulati; prothorax longitudinaliter carinatus et sulcatus, antice ad latera nodosus (fere ut *Prosopli*); elytra antice longitudinaliter cristatus; pedes modici robusti, tibiis intermediis simplicibus, tarsis posticis quam tibiæ vix brevioribus; acetabula intermedia aperta; prosternum postice et mesosternum antice sat fortiter declivia sed haud perpendicularia, hoc antice nullo modo dentiformi nec producto postice late sat fortiter emarginato; segmentum ventrale basale ad apicem perlonge ciliatum; unguiculi divergentes.

Fem. Antennæ quam corpus paullo breviores; segmentum ventrale apicale longitudinaliter canaliculatom.

I am unable to refer the insect for which I propose this new name to any previously described genus. M. Lacordaire [Gen. Col. IX. (2) p. 521] divides the *Niphonides* into two groups distinguished by the greater or less emargination of the eyes. I think this genus must be placed in the former of these, in which it would fall beside *Hathliodes*; but it has not at all the facies of *Hathliodes* and differs structurally from the species of that

genus *inter alia* by its strongly crested elytra and by its wide mesosternum which is strongly emarginate behind. If it be regarded as belonging to the group with the eyes not quite "subdivided" it would have to take its place in the *Symphiletes* group in which it would be distinguishable *inter alia* by its prothoracic sculpture being (not transverse but) longitudinal together with the absence of tomentose depressions on the abdomen of the male. Its real affinity seems to me to be unquestionably with *Atyporis* and *Prosoplus* which it closely resembles in facies, but it differs from both in its mesosternum being in front neither perpendicular nor in the least produced or tuberculate. This latter character, together with the third joint of its antennæ not being perceptibly shorter than the fourth distinguishes it from *Menillus*.

C. Cowleyi, sp. nov, Picea, pedibus antennarum basi et elytris postice rufescentibus; obscure griseo pubescens, elytris ad basin pilis elongatis flavis (in cristis 2 positis) et in medio fascia irregulari maculari (hac e pilis nonnullis albidis nonnullis flavis formata) ornatis; capite prothoraceque sat crebre ruguloso-punctulatis; hoc transversim subquadrato, in medio late leviter sulcato, sulco carina mediana instructo; elytris a basi paullo ultra medium grosse ruguloso-punctulatis et granulatis, ad apicem rotundatis, parte apicali obsolete nec rugulose punctulata, disco obsolete 2- vel 3-costato, angulis humeralibus sat rectis. Long., 6 l.; lat,, $2\frac{2}{3}$ l.

A remarkable insect on account of the two short but strongly elevated longitudinal crests bearing long and dense yellow pilosity and placed one on either side of the scutellar region.

N. Queensland; sent to me by Mr. Cowley; also by Mr. French.

RHYTIPHORA.

R. Frenchi, sp. nov. (Fem.) Nigra, pilis niveis ornata, his in capite (ut linea oculos anguste, antennarumque articulos singulos late, cingens; et ut maculæ diversæ in genis mandibulis et clypeo positæ), in prothorace (ut lineæ transversæ 4 dorsales, his subtus dilatatis et prosterni totam superficiem vestientibus), in elytris (ut maculæ numerossimæ et vitta densa lata lateralis basin haud plane attingens) in sternis (partem medianum minus dense vestiente et in lateribus ut maculæ nonnullæ densæ condensatis), in abdomine (sat dense distributis sed maculis numerosis denudatis interruptis) et in pedibus (totam superficiem vestientibus) dispositis; capite sat grosse punctulato, vertice longitudinaliter canaliculato; prothorace ruguloso, transversim bisulcato; elytris sparsim pergrosse punctulatis, puncturis singulis penicillas singulas

adpressas niveo-pilosas ferentibus; antennis quam corpus paullo brevioribus. Long., 18 l.; lat., $6\frac{1}{2}$ l.

A very fine and distinct species; independently of the pattern of snowy white pubescence the elytra are glabrous; their pattern consists of a large number of isolated and very conspicuous white spots (resulting from the presence of pilosity in each puncture) and a broad lateral stripe of very dense pilosity commencing a little behind the shoulder and almost reaching the apex; the suture moreover is bordered near its apex by a narrow line of white pilosity. The system of markings is very much like that of *Penthea Saundersi*, Pasc., but in that species *inter alia* the patches of white hairs on the elytra are much larger and less numerous and there is no white lateral vitta; the eyes are very much more coarsely granulated in the present species and it is of narrower and more elongate form; these latter characters refer it to the genus *Rhytiphora*. The elytra are rounded at the apex. The prothorax has no lateral tooth and the elytra are devoid of basal granules.

N.W. Australia; in the collection of C. French, Esq.

EROTYLIDÆ.

EPISCAPHULA.

E. nigrofasciata, sp. nov. Oblonga; glabra; nitida; sat convexa; rufa, capite antennis pedibus (tarsis exceptis) prothoracis macula basali (hac antice bilobata) scutello elytrorum sutura maculis 3 (his circa scutellum et in humeris positis) fasciis 2 latis (altera mox ante medium altera sat longe pone medium positis) apice summo et margine laterali summo prosterni parte inter coxas mesosterno metasterno et abdominis segmentis basalibus 3 nigris; capite crebre punctulato; prothorace sat transverso, ad basin haud marginato, antice modice angustato, subtiliter sat sparsim punctulato et puncturis nonnullis sat magnis impresso (his ad basin et latera versus positis, in parte basali quam apicem versus multo majoribus et profundioribus), lateribus fere rectis,—elytris vix striatis, seriatim punctulatis (seriebus postice obsoletis, 2 discoidalibus quam ceteræ multo magis perspicuis); antennarum articulo 4° quam latiori manifeste longiori. Long., $3\frac{1}{5}$ l.; lat., $1\frac{3}{10}$ l.

This species is not unlike a variety of *E. australis*, Boisd., in which the median and post-median rows of spots coalesce into fasciæ, but differs as follows: the red coloring is lighter and more inclining towards a yellowish tone, the prothoracic spot is larger and is bilobed in front, the sides of the prothorax are straighter, the fine puncturation of the prothorax is more sparse and its

coarse punctures (instead of being of equal size and depth in all parts where they occur) are much larger and deeper near the base of the segment than near its apex.

Queensland.

E. brevicornis, sp. nov. Oblonga, postice acuminata; nitida; glabra; convexa; supra obscure rufa, capite prothoracis macula magna basali (hac fortiter transversa et antice 4-lobata) scutello et elytrorum maculis et fasciis (fere ut *E. nigrofasciatæ* dispositis, sed maculis basalibus in basi anguste conjunctis et fascia antica latiori ultra medium attingenti nec margines laterales attingenti) nigris; subtus nigra, prosterni lateribus et segmentis ventralibus ultimis 2 obscure rufis; antennis pedibusque (tarsis rufis exceptis) nigris; capite prothoraceque fere ut *E. nigrofasciatæ*, sed hujus puncturis majoribus inter se sat æqualibus; antennis sat brevibus, articulo 4° quam latiori haud longiori.

This species is at once distinguishable from the preceding and other species (including *E. australis)* by its shorter antennæ in which the fourth joint (instead of being markedly longer than wide) is quite as wide as long. The black mark on the prothorax occupies a little more than the middle one-third of the base and extends forward beyond the middle of the segment; it is deeply bilobed in front and near its front emits on either side a lobe-like process running obliquely forward and nearly reaching the lateral margin; the extreme front also of the prothorax is narrowly black. The prosternum in front of the coxæ is much more strongly convex (almost subcarinate) on the middle line than in the allied species.

N.S. Wales; taken by Mr. Froggatt near Maitland.

E. foveicollis, sp. nov. Oblonga; glabra; nitida; minus convexa; rufa, capite prothoracis maculis nonnullis (sc. macula basali, macula mox intra marginem lateralem medium utrinque posita, et marginis antici parte mediana) scutello elytrorum maculis fasciisque nonnullis (sc. maculis 3 transversim ad basin dispositis, fascia mox ante medium et altera pone medium postis, et apice sat late) antennis pedibus (tarsis exceptis) mesosterno metasternoque nigris; capite fortiter (parte mediana subtiliter) punctulato; prothorace sat transverso, antice parum angustato, subtilissime sparsius punctulato et puncturis nonnullis magnis (his inter se æqualibus, ad basin et latera versus, et præsertim utrinque in fovea magna prope angulos anticos, dispositis) impresso, lateribus parum arcuatis; elytris vix striatis, seriatim punctulatis (seriebus postice obsoletis, 2 discoidalibus quam ceteræ multo magis perspicuis); antennarum articulo 4° quam latiori paullo longiori. Long., 4 l.; lat., $1\frac{1}{2}$ l.

At once distinguished from its allies by the conspicuous large and shallow depression a little within the anterior angles of the prothorax in which there is a cluster of very deep fovea-like punctures.

N. Queensland; taken by Mr. Koebele near Cairns.

THALLIS.

This genus is distinguishable from *Episcaphula* by, *inter alia*, the form of its prosternal process. In *Episcaphula* this process dilates behind the coxæ in the form of a flattened lamina widest at its hind margin which is triangularly emarginate. In *Thallis* (as at present constituted) the prosternal process is more variable but does not (at least in the Australian species) take the form specified above.

T. Macleayi, sp. nov. Oblonga; glabra; nitida; sat convexa; rufa, capite postice prothorace (lateribus exceptis) elytrorum parte circa scutellum fascia mediana et altera subapicali sternis in parte et abdominis maculis nigro-piceis; capite sat fortiter crebre punctulato; prothorace transverso, antice vix angustato, ad basin marginato, sparsim subtiliter punctulato puncturis majoribus confuse intermixtis, lateribus late incrassatis et intra marginem incrassatum longitudinaliter sulcatis; elytris vix striatis, seriatim punctulatis, seriebus postice minus obsoletis, interstitiis subtiliter punctulatis; processus prosternalis modice lati parte mediana convexa, apice rotundata), lateribus carinatis; antennarum articulo 3° quam 4us haud longiori. Long., 2½ l.; lat., 1 l.

Readily distinguishable from the others known to me of the genus by the broad thickened ridge-like margins of the prothorax (which are as wide as the basal joint of the antennæ is long) within which there is a deep narrow longitudinal furrow. It should be noted however that strictly speaking it is not the actual margin itself that is thickened for when the prothorax is closely examined there is seen to be a fine stria-like furrow dividing the true margin (which is normally narrow) from what is really a longitudinal ridge which to a casual glance seems to be an extension of the true margin.

N. Queensland; taken by Mr. Koebele near Cairns.

T. perplexa, sp. nov. Oblonga; glabra; nitida; sat convexa; rufa, capite prothorace scutello elytrorum parte circa scutellum fascia mediana et altera apicali (his in sutura anguste conjunctis) prosterno mesosterni metasternique lateribus antennis pedibusque (tarsis exceptis) nigro- vel rufo- piceis; capite sparsim sat fortiter punctulato; prothorace transverso, antice leviter angustato, ad basin marginato, fere ut caput punctulato, lateribus sat anguste incrassatis et intra partem

incrassatam longitudinaliter sulcatis; elytrorum sculptura ut *T. Macleayi* sed puncturis in seriebus paullo magis subtilibus; processu prosternali latissimo, parte mediana modice convexa postice rotundata, lateribus carinatis; antennarum articulo 3° quam 4us paullo longiori. Long., $2\frac{4}{5}$ l.; lat., $1\frac{1}{10}$ l. (vix).

As far as color and markings are concerned this species has all the appearance of being a slight and somewhat darkly colored variety of the preceding, differing chiefly in the legs and antennæ being darker, the sides of the prothorax dark and the black fasciæ of the elytra narrowly connected along the suture (the hinder one reaching the apex). But it is certainly a distinct species characterised by the sparse puncturation of its head and prothorax, the evidently fine seriate punctures of its elytra, the very much narrower incrassated space just within the true lateral margin of its prothorax, much greater width of its prosternal process, and the evidently greater length of the third joint of its antennæ.

Queensland.

T. subvinula, sp. nov. (Mas.) Oblonga; glabra; sat nitida; sat convexa; nigra; prothorace rufo, elytris maculis binis albido-flavis ornatis; subtus testacea; capite prothoraceque creberrime grossissime punctulatis, hoc linea lævi longitudinali angusta antice posticeque abbreviata instructo; elytris vix striatis seriatim punctulatis (puncturis in seriebus postice obsoletis), interstitiis minus distincte punctulatis; prosterno grosse punctulato, inter coxas sat late convexo, postice rotundato; antennarum articulo 3° quam 4us vix longiori; femoribus anticis subtus dente armatis; tibiis anticis curvatis. Long., $2\frac{1}{3}$ l.; lat., $1\frac{4}{5}$ l.

This species closely resembles *T. vinula*, Er., from which it differs as follows: the head and prothorax are very much more closely and coarsely punctured and the latter is a little more transverse (Erichson says that the prothorax of *vinula* is not shorter than wide, but this is not strictly accurate by measurement); the elytral punctures are decidedly stronger near the base; and the whitish markings on the elytra are smaller, being more abbreviated at both ends, so that they are spots rather than fasciæ.

S. Australia; Eyre's Peninsula.

T. (?) venustula, sp. nov. (Mas.) Oblonga; pubescens; sat nitida; sat convexa; rufa; capite, prothoracis macula transversa basali, scutello, elytrorum parte circa scutellum fascia latissima mediana sutura margine laterali apicalique, mesosterno, metasterno, abdominis segmentis basalibus 2, antennis

et femoribus, nigris, tibiis picescentibus ; capite grosse punctulato, in medio lævi ; prothorace transversim quadrato, antice haud angustato, ad basin marginato, fortiter subcrebre punctulato, marginibus lateralibus subcrenulatis ; elytris haud striatis, seriatim subtilius punctulatis, seriebus postice sat obsoletis, interstitiis seriatim subtiliter punctulatis ; prosterno ut *T. Macleayi ;* antennarum articulo 3° quam 4us paullo longiori ; femoribus anticis subtus ad basin profunde emarginatis ; tibiis anticis curvatis, ad apicem extus dentatis ; palpis maxillaribus magnis securiformibus.

Fem. latet. Long., 2½ l.; lat., 1 l.

Rather closely allied to *T. (?) insueta* from which it scarcely differs structurally ; it is however a much smaller insect, much more nitid, its markings much more sharply defined, its prothorax very much less closely punctured, the seriate puncturation of its elytra much less strong, &c., &c. The extraordinary formation of the front legs is no doubt sexual, as I find the front legs of *T. (?) insueta* similar in the male but normal in the female (except in the external dilatation of the apex of the tibia being common to both sexes).

Victoria.

T. (?) femoralis, sp. nov. (Mas.) Oblonga, sat parallela ; glabra ; minus nitida ; minus convexa ; rufa ; capite prothoraceque piceo-nigris, hoc latera versus dilutiori, scutello elytrorum parte circa scutellum fascia (hac mox antemedium posita) et macula apicali communi (nonnullorum exemplorum hac ad apicem vix attingenti) fere nigris ; corpore subtus hic illic infuscato ; capite prothoraceque grosse sat crebre punctulatis, hoc fere ut *T. venustulæ* (sculptura multo magis grossa excepta) ; elytris quam prothorax parum latioribus, distincte striatis, striis sat grosse punctulatis, interstitiis seriatim punctulatis, sculptura postice obsoleta ; corpore subtus grosse sat crebre punctulato (abdominis apicem versus magis subtiliter) ; processu prosternali lato postice minus prominenti rotundato-truncato, ad latera vix carinato ; antennarum articulo 3° quam 4us paullo longiori, clava minus lato ; femoribus anticis prope apicem subito angulatim angustatis ; tibiis anticis curvatis ad apicem extus leviter angulatim dilatatis.

Fem. pedibus simplicibus. Long., 3 l.; lat., 1 l.

This species seems to be an isolated one. Its sexual characters are much like those of *T. compta*, Er., but the facies of that insect is very different on account of its much more nitid appearance, less strong puncturation, prothorax smaller in proportion to the elytra, antennæ shorter with a more defined club.

Tasmania.

T. (?) *dentipes*, sp. nov. (Mas.) Oblongo-elongata; sat parallela; glabra; nitida sat convexa; rufa; capite, prothoracis parte postica, scutello, elytrorum angulis humeralibus fascia mediana (suturam haud attingenti) et fascia subapicali (marginem lateralem haud plane attingenti), prosterni parte postica, mesosterno, antennis, coxis anterioribus 4, et pedibus, nigris vel nigro-piceis; capite sparsim subtilius punctulato; prothorace vix transverso, antice haud angustato, margine antico antrorsum rotundatim producto, ad basin marginato, subtilius minus crebre punctulato, lateribus fere rectis; elytris vix striatis, seriatim punctulatis, seriebus postice sat obsoletis, interstitiis vix perspicue punctulatis; processu prosternali sat convexo, postice rotundato, lateribus vix carinatis; antennarum articulo 3° quam 4us paullo longiori, clava sat lata; femoribus anticis subtus prope apicem dente forti armatis, tibiis anticis fortiter curvatis. Fem. latet. Long., $2\frac{1}{2}$ l.; lat., $\frac{7}{10}$ l.

A very elongate parallel species, easily recognisable by its markings and by the sexual characters of the male.

Victoria.

As the known Australian species of *Thallis* are now somewhat numerous it seems desirable to attempt a tabular statement of their distinctive characters. In the following attempt I have been obliged to rely upon color and markings more than I could wish on account of there being species unknown to me in nature the descriptions of which do not contain satisfactory information relating to structural characters. In the following table the names in italics are of species which I have placed from a study of their descriptions merely.

A. Upper surface glabrous.
  B. Elytra with a pattern of variegated colors.
    C. Elytra black or piceous around the scutellum.
      D. Prothorax more or less red.
        E. Margins of prothorax normal.
          F. Prothorax entirely bright red.
            G. A wide flat unpunctured space down middle of prothorax ... vinula, *Er.*
            GG. The unpunctured space obsolete (*i.e.*, narrow, raised, and much abbreviated, at both ends ... subvinula, *Blackb.*
          FF. Prothorax partly black or piceous.
            G. Legs black ... ... compta, *Er.*
            GG. Legs red ... ... femoralis, *Blackb.*
        EE. Margins of prothorax widely incrassated within the lateral margin ... Macleayi, *Blackb.*
      DD. Prothorax entirely black.
        E. Prothorax very finely punctulate ... *bizonata*, Macl.
        EE. Prothorax strongly punctulate ... perplexa, *Blackb.*
    CC. Elytra without dark coloring round the

scutellum ... ... dentipes, *Blackb.*
BB. Elytra unicolorous ... ... janthina, *Er.*
AA. Upper surface pubescent.
B. Prothorax more or less red.
C. Median black fascia of elytra wide and straight.
D. Prothorax very closely punctulate ... insueta, *Crotch.*
DD. Prothorax much less closely punctulate venustula, *Blackb.*
CC. Median fascia narrow and zigzag ... ... *Erichsoni*, Crotch.
BB. Prothorax entirely black ... ... *bifasciata*, Crotch.

ENDOMYCHIDÆ.

CRANTEROPHORUS (gen. nov.).

Caput modicum antice modice elongatum; labrum emarginatum; mandibulæ ad apicem bispinosæ; labium fortiter transversum antice emarginatum (partis emarginatæ angulis externis spiniformibus); palpi maxillares modici, articulo ultimo oblongo subcylindrico; palpi labiales breves, articulo ultimo quam longiori triplo latiori antice truncato; mentum ante basin lateraliter utrinque spiniforme; oculi magni prominuli grosse granulati; antennæ sat graciles quam corporis dimidium longiores, articulo basali subpiriformi, 2° parvo, 3° quam præcedentes 2 sublongiori quam 4us 5us que conjuncti vix breviori (hoc quam illo sublongiori), clava sat lata 3-articulata (hujus articulis basalibus 2 intus elongatis acutis, apicali ad apicem truncato); prothorax transversim subquadratus, quam elytra duplo angustior, antice profunde emarginatus, ad basin profunde transversim (et utrinque breviter longitudinaliter) sulcatus; prosternum intercoxas angustissimum, postice vix prominens; mesosternum sat planatum postice angustatum; pedes sat elongati; unguiculi simplices; tarsi subtetrameri, articulo 2° sat brevi; corpus glabrum.

Type *Mycella clavicornis*, Blackb.

In describing the species for which I propose this new name I referred it doubtfully to *Mycella* remarking that the structure of its tarsi is not consistent with a place in that genus. I have since obtained more specimens and have been able to make a proper examination with the result that I find it must stand as the type of a new genus. The internal dilatation and angulation of the joints nine and ten of its antennæ together with the lateral angulation of its mentum suggest alliance with the South American *Epipocus* which it considerably resembles in facies. In Dr. Chapius' tabulation of his groups of *Endomychidæ* its characters place it in the *Epipocites*. In his tabulation of the genera of that Groupe it stands beside *Epipocus* from which it is separated *inter alia* by the strong basal sulcus of its prothorax.

STENOTARSUS.

The following two species may I think be attributed to this genus, which has not been previously recorded as Australian. As however they are both unique in my collection I have not been able to make a complete examination of their mouth organs. In respect of the other characters they agree well with Dr. Chapuis' lengthy diagnosis, the only discrepancies I observe being that the surface of the prothorax is not marked with longitudinal furrows (there is a wide deeply concave space on either side immediately within the sub-lateral carina, but I do not think this is what Dr. Chapuis refers to) and that the basal ventral segment is (though fully as long as the following *three* segments together) scarcely as long as the following *four* together.

S. arithmeticus, sp. nov. Ovalis ; sat nitidus ; pilis subtilibus erectis sat dense vestitus ; rufus, capite prothorace antennis pedibus (tarsis exceptis) et in elytris notis binis (sc. macula discoidali figuram 2 simulanti mox ante mediam posita et macula ovali subapicali) nigris ; prothorace quam longiori plus quam duplo latiori, sparsissime punctulato, sat longe intra marginem carina longitudinali instructo et intra carinam profunde longitudinaliter concavo ; elytris sparsim sat fortiter punctulatis et marginem versus foveis sat magnis (his seriatim positis et prope apicem deficientibus) impressis; antennis sat crassis, quam corporis dimidium paullo brevioribus. Long., $1\frac{4}{5}$ l.; lat., $1\frac{1}{10}$ l.

The mark resembling on one elytron the figure 2 (on the other the same reversed) immediately in front of the middle of each elytron renders this species easy to recognise.

Victoria.

S. commodus, sp. nov. Breviter ovalis ; sat nitidus ; pilis subtilibus erectis sat dense vestitus ; rufus, prothorace metasterno antennis (basi excepta) femoribus et in elytris notis nonnullis (sc. macula magna communi subrotundata mox pone scutellum posita et macula sublaterali magna difformi paullo ante medium posita) nigris ; prothorace fere ut præcedentis sed quam longiori triplo latiori ; et antice magis angustato ; elytrorum puncturis ut præcedentis sed lateribus magis rotundatis ; antennis ut præcedentis. Long., $1\frac{4}{5}$ l. (vix) ; lat., $1\frac{1}{5}$ l.

Apart from the very different coloring and markings this insect differs from the preceding by its very evidently shorter and broader form as well as by its considerably more transverse prothorax which is more narrowed in front.

Australia. I do not know the exact habitat.

PERIPTYCTUS (gen. nov.).

Caput modicum, antice minus elongatum; labrum antice late rotundatum; palporum maxillarium articulus ultimus ovalis, labialium crassus; antennæ sat graciles, quam corporis dimidium breviores, 11-articulatæ, articulo basali fortiter dilatato, 2° multo longiori et multo graciliori, 3° 4° que minutis, 5° elongato (quam præcedentes 2 conjuncti longiori), 6° minuto, 7° paullo longiori, 8° minuto, 9°-11° clavam elongatam (quam 5us-8us conjuncti sublongiorem) formantibus, 11° ad apicem truncato; oculi sat grosse granulati; prothorax transversus, a basi antrorsum angustatus, antice sat emarginatus, intra marginem brevi distantia obtuse carinato, mox intra carinam profunde longitudinaliter concavo, ad basin haud sulcato; elytra ovalia, ad basin vix quam prothorax latiora; scutellum fortiter transversum; prosternum antrorsum (ut *Elateridarum*) valde elongatum ad oris receptionem elongatum, inter coxas latum, postice productum, ad apicem truncatum, inter coxas et in parte postica utrinque subtiliter carinatum; mesosternum latum antice declive; abdominis segmentum basale ceteris conjunctis longitudine æquale; pedes sat graciles; tarsi subtetrameri, articulo 2° modice elongato; unguiculi simplices; corpus setis subtilibus sparsis sat elongatis vestitum.

I do not know of any previously described genus of *Endomychidæ* in which the prosternum is produced anteriorly as a "chin piece" to cover entirely the mouth organs in repose, although the character is by no means wanting among the Australian *Coccinellidæ*. The nearest approach to it that I can find in an *Endomychid* is in the diagnosis of *Cremnodes* where the prosternum is said to be "prolonged towards the mouth." The present species however could not well be placed near *Cremnodes;* working by Dr. Chapuis' tabulations of *Endomychidæ* one would have to place it in the *Lycoperdinites* beside *Coniopoda.* Its antennæ are almost as peculiar structurally as is its prosternum.

P. russulus, sp. nov. Ovalis; minus convexus; brunneo-rufus, prothoracis disco infuscato; sparsim sat subtiliter punctulatus, puncturis in elytris subseriatim dispositis. Long., 1 l.; lat., $\frac{3}{5}$ l.

Victoria; on a small fungus in rotten wood in the Alpine District.

IDIOPHYES (gen. nov.).

Caput modicum, antice minus elongatum; labrum antice late rotundatum; palporum maxillarium articulus ultimus elongatus sub-cylindricus ad apicem acuminatus, labialium magnus subquadratus; antennæ quam corporis dimidium

breviores, robusti, 10-articulatæ, articulo basali sat crasso subpiriformi, 2° quam basalis vix angustiori subgloboso, 3°-7° multo gracilioribus filiformibus, 8°-10° clavam sat latam formantibus (8° vix, 9° sat fortiter, transversis, 10° quam præcedentes 2 conjuncti sat breviori); oculi sat grosse granulati; prothorax valde transversus, antice paullo angustatus leviter emarginatus, longe intra marginem lateralem carina longitudinali instructo, trans basin fortiter sulcato; scutellum scutiforme; elytra breviter ovalia sat fortiter convexa; prosternum inter coxas sat angustum, postice vix productum; mesosternum sat latum, postice angustatum; abdominis segmentum basale quam sequentia 3 vix longius; pedes sat graciles; tarsi subtetrameri, elongati, articulis inter se æquilatis, articulo basali quam 2us tarsorum anticorum breviori posticorum longiori; unguiculi simplices; corpus setis gracilibus sat elongatis minus crebre vestitum.

The antennæ of the insect on which I found this genus having only ten joints and its comparatively long and slender tarsi render it easy to identify. I think it is clearly allied to *Lycoperdina* but as I have seen only one example I have not been able to investigate one or two characters that its place in Dr. Chapuis' tabulation depends upon; *e.g.*, I cannot satisfy myself as to whether its prosternum projects slightly or not at all clear of the front coxæ.

I. brevis, sp. nov. Breviter ovalis, postice acuminatus; sat convexus; setis subtilibus suberectis elongatis fulvis minus crebre vestitus; fulvus, palpis pedibusque dilutioribus; prothorace quam longiori triplo latiori, parte laterali sparsim distincte punctulato, parte discoidali fere lævi angulis posticis rectis, basi quam elytrorum basis vix angustiori; scutello distincte punctulato; elytris substriatis, striis subfortiter minus crebre punctulatis. Long., 1 l. (vix); lat., $\frac{3}{5}$ l.

Victoria.

ELEOTHREPTUS (gen. nov.)

Caput modicum antice modice elongatum; labrum late leviter emarginatum; mandibuli ad apicem bifidi; palporum maxillarium et labialium articulus penultimus fortiter dilatatus, ultimo magis angusto elongato-subconico; antennæ quam corporis dimidium breviores, sat validæ, 11-articulatæ (articulo basali modico subpiriformi, 2° parvo, 3° longiori, 4° paullo breviori, 5°-8° inter se sat æqualibus quam 4us parum brevioribus, clava compacta obovata suturis inter articulos vix distinctis); oculi sat grosse granulati; prothorax fortiter transversus, æqualis, antice sat angustatus subtrun-

catus; scutellum triangulare; elytra late ovalia subdepressa, quam prothoracis basis ad basin vix latiora; prosternum inter coxas sat latum, postice truncatum vix productum; mesosternum transversum antice rotundato-truncatum; abdominis segmentum basale quam cetera conjuncta vix brevius; pedes modici; tarsi subtetrameri, articulis basalibus 2 brevibus, apicali valde elongato; unguiculi simplices; corpus setis suberectis subtilibus minus elongatis sat crebre vestitum.

This is a remarkable little insect, of facies decidedly aberrant in the *Endomychidæ* but certainly belonging to that family I think, by the structure of its mouth organs and its tarsi. It has a certain resemblance, on a casual glance, to the *Trogositid* genus *Thymalus*, though it is of much less convex form—and of course with no structural affinity thereto.

E. punctulatus, sp. nov. Late ovalis; minus convexus; setis suberectis vestitus; brunneo-fulvus, capitis prothoracisque parte mediana elytris et (plus minusve) corpore subtus infuscatis; capite prothoraceque distincte sat crebre, elytris dupliciter (sc. subtiliter et fortiter) minus crebre, punctulatis; prothorace quam longiori plus quam duplo latiori; elytris nec striatis nec seriatim punctulatis. Long., 1 l.; lat., $\frac{7}{10}$ l. (vix).

S. Australia; on a fungus on marshy ground near Port Adelaide.

DYSCERASPHORUS (gen. nov.)

Caput magnum, antice parum elongatum; labrum minutum; palporum maxillarium articulus ultimus elongato-ovalis ad apicem acuminatus, labialium lato transverso; antennæ breves, quam corporis dimidium multo breviores, 6-articulatæ (clava haud inclusa), articulo basali 2° sat æquali, 2° quam 3us paullo longiori, 3°-6° inter se sat æqualibus, clava triangulari quam articuli ceteri conjuncti paullo breviori haud distincte articulato fortiter dilatato; oculi parvi grossissime granulati; prothorax fortiter transversus, æqualis, antice angustatus et fortiter sinuatim emarginatus; scutellum parvum; elytra subcuneiformia, epipleuris subhorizontalibus antice latis; prosternum inter coxas sat angustum, postice paullo dilatatum et leviter productum, ad apicem truncatum; mesosternum breve transversum, antice declive; abdominis segmentum basale quam sequentia 3 conjuncta vix longius; pedes modici; tarsi subtetrameri, articulis basalibus 2 inter se sat æqualibus (ultimo quam basales 2 conjuncti subbreviori); unguiculi simplices; corpus glabrum, convexum.

This genus is a very isolated one in the *Endomychidæ* to which

its structure seems clearly to refer it. Its antennæ with only seven joints (or nine if the club be regarded as three-jointed; I cannot however satisfy myself that it is of more than one joint) render it very easy to recognise. In general appearance it bears some resemblance to species of the *Erotylid* genus *Euxestus*. The excessively coarse granulation of its small eyes is a notable character.

D. laticeps, sp. nov. Convexus; brevis; nitidus; rufo-brunneus; supra subtiliter (minus perspicue) sat æqualiter sat crebre punctulatus. Long., $\frac{4}{5}$ l.; lat., $\frac{1}{2}$ l.

N. Queensland; taken by Mr. Koebele near Cairns.

COCCINELLIDÆ.

EPILACHNA.

E. Terræ-reginæ, (? *E. guttato-pustulatæ*, Fab., var. nov.). Late ovalis; pubescens; brunneo ferruginea, prothorace ad latera flavescenti; hoc crebre fortius sat æqualiter, elytris dupliciter (*i.e.*, fere ut prothorax sed paullo minus crebre, et grosse sparsim), punctulatis. Long., 4 l.; lat., 3 l.

At once distinguishable from all its described congeners of Australia and adjacent places by its uniform red-brown color. It appears to me to be quite possibly an extreme var. of *E. guttato-pustalata*, but in any case it seems desirable that even as a variety it should bear a distinctive name.

N. Queensland; taken by Mr. Cowley, near Cairns.

CŒLOPHORA.

C. nigro-vittata, sp. nov. Late ovalis; flavo nigroque variegata; colore nigro in prothorace (ut linea basalis angulatim bis dilatata et macula discoidalis papilionis figuram simulans), in elytris (ut margo integer, vittæ 3—his a sutura discedentibus ex ordine magis elongatis, et macula subapicalis) in epipleuris (ut margo externus), in corpore subtus toto (nonnullorum exemplorum prosterni abdominisque parte excepta), et in pedibus (nonnullorum exemplorum his nihilominus, femoribus posticis exceptis, flavis) disposito; prothorace crebre distincte, elytris magis fortiter minus crebre, punctulatis; prosterno medio planato, antice acuminato, vix perspicue bicarinato; metasterno antice truncato. Long., $2\frac{1}{2}$ l.; lat., $2\frac{1}{5}$ (vix) l.

The bright yellow surface, marked on the elytra with three discoidal black vittæ, renders this species easily recognisable among its congeners. None of the vittæ are quite joined to the black color of the base; the first vitta is near and parallel to the suture and does not extend much beyond the middle of the

elytra; the second runs obliquely from the humeral callus towards the suture (not however reaching it), extends to about a quarter the length of the elytra from the apex, and in some examples is interrupted a little behind the middle of the elytra; the third also commences on the callus and runs (parallel to the lateral margin) to the neighborhood of the apex. The vitta are variable in their breadth and in some examples have a much more sinuous outline than in others. The prosternal foveæ in this species are extremely well defined.

N. Queensland; taken by Mr. Koebele near Cairns.

CYCLONEDA.

C. barronensis, sp. nov. Late ovalis, postice subacuminata; flavo nigroque variegata; colore nigro in prothorace (ut linea transversa apicalis et macula bifida basalis), in elytris (ut margo integer, macula basalis discoidalis, fascia lata mediana, et fascia lata postmediana,—nonnullorum exemplorum fasciis interruptis), in epipleuris (totis macula elongata pone humeros excepta), in corpore subtus toto (abdomine,—segmenti basalis parte mediana nihilominus nigro,—excepto) et in pedibus (horum anticorum femoribus subtus tibiis tarsisque, intermediorum tibiis tarsisque, posticorum tarsis, flavis) disposito; antennis quam capitis (oculis inclusis) latitudo paullo longioribus, articulis ultimis 2 intus sat dilatatis, apicali ad apicem truncato; clypeo antice vix emarginato; oculis sat fortiter granulatis; prothorace fortiter transverso, antice paullo angustato, crebrius subtilius punctulato, antice bisinuatim sat fortiter emarginato, marginibus parum arcuatis; elytris magis fortiter minus crebre punctulatis. Long., 2 l,; lat., $1\frac{3}{5}$ l.

The following characters refer this species to the genus *Neda* (as characterised by Dr. Chapuis, Gen. Col., vol. XII.):—Head free, base of antennæ free, epipleuræ without distinct foveæ, body glabrous, antennæ of 11 joints, abdominal lamellæ well-defined, base of elytra gently emarginate all across, antennæ comparatively long, prosternum without a lateral fovea, scutellum normally large. I am a little doubtful to which of Dr. Chapuis' subgenera it belongs (Crotch seems to think they should be regarded as valid genera), but on the whole it is most suitably placed I think in *Cycloneda (Daulis*, Muls.). It is a very pretty and conspicuous species. The black and yellow coloring of the upper surface are so mingled that it is difficult to say which should be regarded as the color of the derm. If it be regarded as black, the yellow markings are, a fascia on the prothorax narrowest in the middle where it does not reach into the basal half of the prothorax (at the actual middle however it has an angular

projection hindward which slightly widens it) and widening out laterally to occupy the whole of the lateral margins, on each elytron (*a*) a yellow mark roughly resembling a figure 3 with its base towards the suture and its points towards the base of the elytra not quite touching the margin anywhere (*b*) an elongate transverse patch (constricted in its middle) a little behind the middle of the elytra and (*c*) an oval spot close to the apex. In some examples the intermediate (*b*) yellow mark is connected in its middle by a slender line with the subbasal mark and (more broadly) at its inner extremity with the subapical mark. The black markings (regarding the derm color as yellow) are described in the Latin diagnosis above.

N. Queensland; taken by Mr. Koebele near the Barron River.

NEDA.

N. bicolor, Blackb. Mr. Koebele obtained in N. Queensland two specimens which I attribute to this species and which (if I am right in doing so) show it to be subject to considerable variation. One of these two examples has the prothorax widely bordered with yellow; the other is considerably larger than the type (long., $3\frac{1}{2}$ l.) and also differs in having a large faintly defined reddish blotch immediately behind the base, and close to the external margin, on each elytron. I can find no other differences than those I have noted, but as it is possible that the examination of more specimens may prove the larger example to represent a distinct species I will call it var. ? *picturata*.

ORCUS.

O. Lecanii, sp. nov. (Mas.). Subhemisphæricus; sat fortiter convexus; subtiliter minus crebre (quam *O. Australasiæ*, Boisd., paullo magis perspicue sed haud multo aliter; quam *O. Lafertei*, Muls. minus subtiliter multo magis perspicue; quam *O. punctulatus*, Blackb., multo minus crebre vix minus fortiter; quam *O. chalybeus*, Boisd., paullo minus crebre minus fortiter) punctulatus; supra obscure nigro-viridis vix auratus (labro et prothoracis margine antico testaceis exceptis); subtus (antennis palpis pedibusque inclusis) testaceis; prothorace ad latera strigoso-ruguloso; elytris ad latera minus reflexis (fere ut *O. Australasiæ*); clypeo ad latera fortiter laminato (fere ut *O. Australasiæ*); prosterni lateribus et elytrorum epipleuris foveolatis. Long., $2\frac{1}{5}$ l.; lat., 2 l.

Fem. prothorace antice vix testaceo-marginato; elytris minus perspicue punctulatis. Long., $2\frac{2}{5}$ l.; lat., $2\frac{1}{5}$ l.

The distinctness of the puncturation on the upper surface in the *Orci* seems to depend chiefly on the nature of the derm which

in some species is smoother than in others and shows the puncturation more conspicuously. In the present species the derm in the male example before me is very lævigate and consequently the puncturation very distinct while in the female the derm is quite coriaceous and consequently the puncturation very obscure. This species differs from all its previously described congeners by its coloration, and also from *chalybeus* by the much greater width of the dilated side pieces of its clypeus; from *cyanocephalus cœlestis* and *punctulatus* by its much less strongly impressed elytral puncturation, from *Lafertei* by its less convex form, and from *Australasiæ*, *bilunulatus*, *splendens*, *ovalis*, and *nummularis* by the presence of foveæ on the elytral epipleuræ.

N. Queensland; taken by Mr. Koebele; feeds on *Lecanium depressum*.

O. obscurus, Blackb. This insect which I described as a var. ? of *Australasiæ* is a good species as I find that its elytral epipleuræ have a small distinct fovea, which I overlooked when I was writing the description.

LIPERNES.

L. gibbosus, sp. nov. Late ovalis; valde convexus; sat nitidus; piceo-niger, vix æneo-micans; pube cinerea sat dense vestitus; subtiliter sat crebre punctulatus. Long., $\frac{9}{10}$ l.; lat., $\frac{7}{10}$ l. (vix).

Very close to *L. subviridis*, Blackb., but differing from it in the almost complete absence of an æneous tone of color and in its much greater convexity, which is most noticeable if the insect be looked at from the side when the length of the elytra is seen to be not much greater than their height; whereas in *subviridis* the length is not much less than twice the height.

N. Queensland; taken by Mr. Koebele.

L. creber, sp. nov. Late ovalis; valde convexus; minus nitidus; piceo-niger; pube cinerea sat dense vestitus; crebre sat fortiter punctulatus. Long., $\frac{3}{5}$ l.; lat., $\frac{1}{2}$ l.

Resembling *L. gibbosus* in form this species differs from its described congeners by its very small size and the close strong puncturation of its surface.

N. Queensland; taken by Mr. Koebele in the Cairns District.

GYMNOSCYMNUS.

G. explanatus, sp. nov. Fere circularis; valde convexus· nitidus; niger, elytris maculis binis magnis rufis ornatis, capite rufotestaceo antennis palpis pedibusque plus minusve rufescentibus, nonnullorum exemplorum corpore subtus rufescenti; supra crebrius subtiliter (latera versus et in prothorace magis fortiter) punctulatus; prothorace fortiter transverso,

hujus basi quam elytrorum basis vix angustiori; elytris ad latera late explanatis; sternis et abdominis segmento basali in parte mediana sparsim distincte punctulatis.

Var. maculis in utroque elytro conjunctis, sicut apparet vitta lata discoidalis. Long., $\frac{4}{5}$ l.; lat., $\frac{4}{5}$ l.

Very like *G. 4-maculatus*, Blackb., but *inter alia* having the head red, the prothorax more strongly punctulate and the lateral margins of the elytra much more strongly explanate. The epipleuræ of the elytra at their widest part are not much less than half as wide as the whole metasternum.

N. Queensland; taken by Mr. Koebele near Cairns.

PLATYOMUS.

When I characterised *Scymnodes* I had not seen *Platyomus*, but concluded that it was distinct because one of the generic characters assigned to the latter is "mesosternum carinate." Having since obtained examples of *Platyomus* I have felt obliged to regard the two genera as identical and to believe that the mesosternal carina is merely a specific character. I can find no other character whatever to distinguish *Scymnodes difficilsi*, Blackb., generically from *Platyomus* than the absence of that carina. As to the number of joints in the antennæ it is possible that my observation is at fault (although the antennæ of *S. difficilis* still appear to me only ten-jointed). But as Mulsant and Chapuis were unable to agree as to the joints in the antennæ of *Platyomus* (Mulsant counting them as ten) I do not consider this character reliable. I think therefore that *Scymnodes* should be treated as a synonym of *Platyomus* and the carination of the mesosternum (which after all is not at all strongly marked in *Platyomus lividigaster*) cease to be regarded as a generic character.

The structure of the claws in *Platyomus* (including *Scymnodes*) calls for remark. These are stated to be "appendiculate" in all the generic diagnoses. The basal piece of each claw is compressed and ends in a point directed downward. But in the males of all the species of which I have seen this sex the apical piece of the four anterior claws is very close to the basal piece and is of the same length as the downward directed point of the latter, so that these claws appear to be bifid rather than appendiculate. The males are also distinguishable by the fifth ventral segment being emarginate or at least sinuate behind.

A remarkable character of *Platyomus* consists in the great size and unusual form of the piece that should be called, I believe, the metasternal lamella. From the inner hindmargin of the middle coxa the hind suture of the piece runs obliquely and almost straight to the suture that separates the metasternum from its

episternum and reaches it scarcely in front of the middle of the episternum. This structure seems to associate these insects with *Rhizobius*. The genus *Platyomus* (as I understand it) is, then, distinguishable by the following characters:—Body pubescent; epipleuræ not foveolate; eyes not coarsely granulated nor placed obliquely; antennæ of medium length; metasternal lamellæ very large and of the form described above; abdominal lamellæ small and complete; middle of prosternum forming a raised flattened space limited on either side by a fine carina; mesosternum large and conspicuous narrowed from the front hindward (its front margin emarginate, its surface flattened, and carinate or not); claws appendiculate (the anterior subbifid in the male). It will be seen from the above that the only structural characters I can find reliable to separate *Platyomus* from all the species at present standing in *Rhizobius* are the form and granulation of the eyes, and the sexual character of the claws.

P. cribratus, sp. nov. (Mas.) Sat late ovalis; sat convexus; pilis albidis brevibus erectis sat dense vestitus; sat nitidus; piceo-niger; capite prothorace (basi media excepta), antennis palpis et abdominis parte apicali rufescentibus; capite sparsim subtilius, prothorace crebre subtilius, elytris crebre dupliciter (sc. subtiliter et subgrosse) punctulatis; puncturis in elytris nec versus latera nec versus apicem ullo modo minus concinne impressis; elytris pone humeros ad latera fortiter rotundato-dilatatis; mesosterno carinato; unguiculis anterioribus 4 subbifidis. Long., $1\frac{2}{5}$ l.; lat., $1\frac{1}{5}$ l.

The distinguishing characters of this species are the strong dilatation of the sides of its elytra behind the shoulders, the mixture of fine and course punctures on its elytra (in both which it agrees with *S. Koebelei*, Blackb.) and the uniform distribution on the elytra of these punctures which do not become feebler or less deep or close towards the sides and apex. This latter character distinguishes it from *S. Koebelei*, of which moreover the prothorax is black. The puncturation of the elytra also is throughout closer than *S. Koebelei*.

N. Queensland; taken by Mr. Koebele near Cairns.

P. baccæformis, sp. nov. (Fem.) Breviter late ovalis; valde convexus; sat nitidus; pilis albidis brevibus erectis sat dense vestitus; testaceo-rufus, elytris (margine laterali et apicali latis exceptis) prosterni parte mediana meso- et metasternis et abdominis parte mediana basali piceis; capite sparsim subtilius, prothorace crebre subtilius, elytris dupliciter (sc. subtiliter et sat fortiter) punctulatis; puncturis in elytris latera apicemque versus subobsoletis; elytris pone humeros ad latera fortiter rotundato-dilatatis; mesosterno

haud carinato : unguiculis omnibus appendiculatis. Long., $1\frac{1}{2}$ l. ; lat., $1\frac{1}{5}$ l.

Near. *S Koebelei* but certainly distinct, differing widely from it in color. The present species, moreover, is shorter and broader than *S. Koebelei* and much more strongly convex, so that looked at from the side its greatest height is considerably more than half its greatest length. The post-humeral dilatation of the elytra and their puncturation are not much different from those of *S. Koebelei* but the elytral puncturation is a trifle less strong. From the bright coloring and great convexity of this insect I should have expected it to be a male, but it seems to be certainly a female.

N. Queensland ; taken by Mr. Koebele near Cairns.

P. (Scymnodes) Koebelei, Blackb. In this species the mesosternum is not carinate and the anterior four claws are subbifid in the male, the intermediate less markedly so than the front ones.

P. (*Scymnodes*) *immaculatus*, Blackb. (Mas.) Sat late ovalis ; sat convexus ; pilis albidis brevibus erectis sat dense vestitus ; piceo-niger, capite antennis palpis pedibus anticis femorum intermediorum basi tarsis abdomine et prothoracis angulis anticis summis testaceis ; capite sparsim subtilius, prothorace crebre subtilius, elytris dupliciter (sc. subtilius et sat grosse), punctulatis ; puncturis in elytris latera apicemque versus obsoletescentibus ; elytris pone humeros ad latera fortiter rotundato-dilatatis ; mesosterno haud carinato ; unguiculis anterioribus subbifidis. Long., $1\frac{7}{10}$ l.; lat., $1\frac{2}{5}$ l.

This is the insect which I originally called "var.? *immaculatus*" of *Koebelei*. The inspection of a second specimen together with two more of *P. Koebelei* has satisfied me that it is a good species. Besides the color differences I find that the elytral puncturation of *immaculatus* is distinctly closer than of *Koebelei*.

N.S. Wales ; taken by Mr. Koebele near Gosford.

P. (*Scymnodes*) *fulvohirtus*, Blackb. (Mas.) Breviter late ovalis ; valde convexus ; pilis albido-fulvescentibus brevibus erectis sat dense vestitus ; totus piceo-niger, antennis abdomineque testaceis exceptis ; capite prothoraceque crebre minus subtiliter, elytris dupliciter (sc. subtilius et sat grosse) punctulatis ; puncturis in elytris latera apicemque versus paullo minus fortiter impressis ; elytris pone humeros minus fortiter rotundato-dilatatis ; mesosterno haud carinato ; unguiculis anterioribus subbifidis. Long., $1\frac{3}{5}$ l.; lat., $1\frac{2}{5}$ l. (vix).

This is the insect which I originally called "var.? *fulvohirtus*" of *Koebelei*. The material now before me however satisfies me that it is a distinct species. Besides great difference in color it

is distinguished from *Koebelei* by its much more closely punctured head, the less dilatation of the sides of its elytra, the stronger emargination of its fifth ventral segment, and its shorter and more convex build.

Queensland; taken by Mr. Koebele near Toowoomba.

P. (*Scymnodes*) *Eugeniæ*, Blackb. (Fem.) I take this to be probably the female of *P. immaculatus*, Blackb. It differs from the male of that species in its darkly colored head and front coxæ, in its anterior claws not being subbifid and in its fifth ventral segment being rounded behind. I originally considered it a possible var. of *P. Koebelei*.

P. consimilis, sp. nov. (Mas.) Sat late ovalis; minus convexus; pilis albidis brevibus erectis sat dense vestitus; piceo-niger, elytris macula magna apicali sanguinea ornatis, antennis palpis tibiis anticis et tarsis omnibus rufescentibus, abdomine rufo-testaceo; capite crebrius subtilius, prothorace crebrius paullo magis fortiter, elytris sat crebre sat fortiter sat æqualiter, punctulatis; elytris pone humeros ad latera sat fortiter rotundato-dilatatis; mesosterno haud carinato; unguiculis anterioribus subbifidis.

Fem. vix differt nisi segmento ventrali 5° haud emarginato et unguiculis omnibus appendiculatis. Long., $1\frac{3}{5}$ l.; lat., $1\frac{3}{10}$ l.

This species is very much like *S. Koebelei*, but differs from it in a number of characters; it is of less convex form (viewed from the side the summit of the outline curve is at the middle of the insect in *Koebelei* but considerably behind the middle in *consimilis*); the apical spot on its elytra is much larger; its head is much more closely punctulate; its elytra are much more evenly punctulate there being little or no difference *inter se* in the size of the punctures, all of which are as large and strong as the coarser punctures in *Koebelei*.

Queensland; taken by Mr. Koebele.

P. obscuricollis, sp. nov. (Mas.) Ovalis (minus late); sat convexus; pilis albidis (exempli typici vix fulvescentibus) brevibus erectis sat dense vestitus; piceo-niger, prothoracis macula magna utrinque posita antennis abdominisque parte apicali fulvis; capite crebrius subtilius, prothorace crebrius paullo magis fortiter, elytris dupliciter (sc. subtiliter et sat fortiter) sat crebre, punctulatis; elytrorum puncturis apicem versus magis fortiter impressis; elytris pone humeros ad latera fortiter rotundato-dilatatis; mesosterno haud carinato; unguiculis anterioribus leviter subbifidis. Long., $1\frac{4}{5}$ l.; lat., $1\frac{2}{5}$ l.

In the unique example of this insect the markings of the prothorax (perhaps variable) are most easily described if the fulvous

tint be regarded as the ground color. The black then appears as a triangle its base occupying the whole base of the segment and its apex on the middle of the disc, but from the apex the black coloring is narrowly produced forward and then dilates again along the front margin of the prothorax and is very narrowly returned along the lateral margins to join the basal black portion. The species is also notable by the coarsest puncturation of its elytra being placed near the apex, and by the sexual structure of the anterior claws being less pronounced than is usual in the genus—the apical piece of those claws being markedly longer than the projecting process of the basal piece; nevertheless the claws in question are evidently different from the hind ones. The prothorax is much less brightly colored than in the other species with markings on that segment.

Among the *Coccinellidæ* of Mr. Koebele's Queensland Expedition is an example which seems to be the female of this species. Apart from the ordinary sexual characters in the claws and fifth ventral segment I do not find any difference from the male type except in the elytral puncturation being very much closer and finer. I find nothing analogous in any other species of the genus —the females not being (so far as my observations go) punctured differently from the males. But instances of abnormal puncturation are not very rare among the Australian *Coccinellidæ* and I am disposed to regard this as probably an instance of that kind.

N. Queensland; taken by Mr. Koebele near Cairns.

P. terminalis, sp. nov. (Fem.) Sat late ovalis; sat convexus; pilis albido-fulvis brevibus suberectis sat dense vestitus; piceo-niger, prothoracis lateribus antennis palpis tibiis tarsis abdomineque (hoc in parte basali mediana infuscato) testaceis, elytrorum apice summo sanguineo; capite sparsim subtiliter, prothorace subtiliter vix magis crebre, elytris crebre minus subtiliter, punctulatis; elytris pone humeros ad latera modice rotundato-dilatatis; mesosterno haud carinato; unguiculis omnibus appendiculatis. Long., $1\frac{3}{5}$ l.; lat., $1\frac{1}{5}$ l.

The coloring of this species scarcely differs from that of *P. lividigaster*, Muls., except in the tibiæ being all decidedly testaceous, the middle of the abdomen blackish at the base and the extreme apex of the elytra sanguineous. From *lividigaster* it differs *inter alia* by its mesosternum not carinate and the much closer and decidedly less coarse puncturation of its elytra, but is certainly a near ally of that species.

N. Queensland; taken by Mr. Koebele near Cairns.

P. lividigaster, Muls. I have not seen a male of this species, and I should judge from his description that Mulsant had only the female before him. The two females that have come under my notice are both from N.S. Wales.

The following tabular statement will probably assist in distinguishing the species of this genus :—

A. Mesosternum not carinate.
  B. Prothorax of uniform (or nearly so) piceous color.
    C. Apex of elytra sanguineous.
      D. Puncturation of head sparse.
        E. Lateral border of elytra widely sanguineous ... ... *baccæformis*, Blackb.
        EE. Apex only of elytra sanguineous ... *Koebelei*, Blackb.
      DD. Puncturation of head close ... ... *consimilis*, Blackb.
    CC. Apex of elytra not sanguineous.
      D. Head sparsely punctured... ... ... *immaculatus*, Blackb.
      DD. Head closely punctured ... ... *fulvohirtus*, Blackb.
  BB. Prothorax with a large testaceous or fulvous blotch on either side.
    C. Apex of elytra sanguineous.
      D. Elytra æneous ... ... *difficilis*, Blackb.
      DD. Elytra pitchy black ... ... *terminalis*, Blackb.
    CC. Elytra of uniform piceous color ... ... *obscuricollis*, Blackb.
AA. Mesosternum carinate.
  B. Prothorax red (or with only some basal infuscation) ... ... *cribratus*, Blackb.
  BB. Prothorax piceous, a large pallid blotch on either side ... ... *lividigaster*, Muls.
  BBB. Prothorax uniformly piceous or black ... *Forestieri*, Muls.

SCYMNUS.

S. operosus, sp. nov. Ovalis; sat nitidus; pube albida vestitus, hac inæqualiter distributa (i.e. hic et illic ut maculæ vel fasciæ condensata); niger, antennis palpis tibiis tarsisque flavis; crebre subtilissime punctulatus; prosterno medio longitudinaliter depresso; spatio depresso sat lato antrorsum leviter angustato antice obtuso utrinque subtiliter carinato; lamellis abdominalibus haud integris; sutura postice subtiliter carinata. Long., 1 l.; lat., $\frac{2}{5}$ l.

This species is recognisable by its entirely black upper surface with white pubescence arranged in patches; these form a narrow more or less interrupted lateral border which emits a branch from below the shoulders running about halfway across the elytron and another behind the middle of zigzag form running interruptedly to the suture. In my tabulation of *Scymnus* (Tr. R.S., S.A., 1892, pp. 248, &c.) the present species falls beside *S. simplex*, Blackb., from which its color and the peculiar arrangement of its pubescence at once separate it.

Queensland; taken by Mr. Koebele in several localities.

S. brisbanensis, sp. nov. Ovalis; sat nitidus; pube albido-fulvescenti vestitus; niger, prothorace ad latera et elytris apicem versus dilutioribus, antennis palpis tarsisque flavis; crebre subtilissime punctulatus; prosterno medio longi-

tudinaliter depresso; spatio depresso minus lato antice angustato utrinque subtiliter carinato; elytrorum sutura haud carinata; lamellis abdominalibus haud integris. Long., 1 l.; lat., $\frac{7}{10}$ l.

This is a species of very obscure appearance. In my tabulation of *Scymnus* it falls beside *lubricus*, Blackb., from which it differs *inter alia* by its slightly more evident puncturation, and dark legs.

Queensland; Brisbane.

S. impictus, sp. nov. Ovalis; sat nitidus; pube albida vestitus; totus rufo-brunneus; crebre subtilissime punctulatus; prosterno medio longitudinaliter depresso; spatio depresso sat lato fere parallelo utrinque subtiliter carinato; elytrorum sutura vix subtilissime carinata; lamellis abdominalibus haud integris. Long., 1 l.; lat., $\frac{3}{5}$ l.

The uniform red-brown color of this insect distinguishes it at once from all its allies. In my tabulation it falls beside *australis* from which it differs *inter alia* by its evidently more convex form and the absence of dark markings.

Queensland; taken by Mr. Koebele at Toowoomba.

S. obumbratus, sp. nov. Ovalis; sat nitidus; pube albida vestitus; rufo-brunneus, capite (labro excepto) prothoraceque nigris; sparsim subtilissime punctulatus; prosterno medio longitudinaliter depresso; spatio depresso sat lato fere parallelo utrinque subtiliter carinato; elytrorum sutura haud carinata; lamellis abdominalibus haud integris. Long., 1 l.; lat., $\frac{3}{5}$ l.

Resembles the preceding which it falls beside in my tabulation, differing from it and *australis* in color and in the sparse puncturation of its elytra.

Queensland; taken by Mr. Koebele at Toowoomba.

S. Terræ-reginæ, sp. nov. Breviter late ovalis; sat nitidus; pube albida vestitus; pallide testaceus, elytris hic et illic indistincte obscurioribus; subtilissime sat crebre punctulatus; prosterno medio longitudinaliter depresso; spatio depresso sat lato antice minus angustato utrinque subtiliter carinato; elytrorum sutura haud carinata; lamellis abdominalibus haud integris. Long., $\frac{4}{5}$ l.; lat., $\frac{3}{5}$ l.

This species differs from its allies *inter alia* by its very small size, its short wide form and its uniformly pallid color. The darker blotches on its elytra are scarcely noticeable and look as if they were merely the thickly folded parts of the wings showing through, but on close examination they seem to be real infuscation. In my tabulation of *Scymnus* this insect falls with the preceding two beside *australis*.

N. Queensland; taken by Mr. Koebele near Cairns; also sent by Mr. Cowley.

S. ementitor, sp. nov. (Mas.) Sat late ovalis; sat nitidus; pube albida vestitus; niger, capite prothorace (vitta mediana lata excepta) antennis palpis pedibusque anticis pallide flavis, abdomine (parte mediana basali excepta) tarsisque testaceo-brunneis; capite sat crebre minus subtiliter, prothorace crebre minus subtiliter, elytris crebre dupliciter (sc. subtiliter et subfortiter) punctulatis; prosterno medio longitudinaliter depresso; spatio depresso minus lato antice angustato utrinque subtiliter carinato; elytrorum sutura haud carinata; lamellis abdominalibus haud integris.

Fem. capite et pedibus anticis (tarsis exceptis) obscuris. Long., $1\frac{1}{2}$ l.; lat., $\frac{1}{5}$ l. (vix).

In my tabulation of *Scymnus* this species does not fall very naturally beside any there characterised; it will stand under the heading "HH. Puncturation of elytra much better defined" on p. 249, and is at once distinguishable from all the rest of that group by its prothorax black in the middle with the sides very broadly of a pale yellow color. It bears an extraordinary resemblace to *Platyomus lividigaster*, Muls., from which it differs in generic characters and also in the less coarse puncturation of its elytra, &c.

N. Queensland; taken by Mr. Koebele near Cairns; also sent by Mr. Cowley from the same place.

S. Cowleyi, sp. nov. Sat late ovalis; valde convexus; sat nitidus; pube albida densa erecta vestitus; niger, capite prothorace elytrorum apice antennis palpis pedibus anticis (femoribus supra et subtus lineatim infuscatis) tarsis omnibus abdomineque rufo-testaceis; capite sparsius subtillissime, prothorace crebre subtilissime, elytris crebre sat subtiliter, punctulatis; prosterno medio longitudinaliter depresso; spatio depresso sat lato antice acuminato utrinque subtilissime carinato; elytrorum sutura postice subtilissime carinata; lamellis abdominalibus haud integris. Long., $1\frac{3}{5}$ l.; lat., $1\frac{1}{10}$ l. (vix).

In my tabulation (vide supra) this species stands beside *poonindiensis* and *Meyricki*, differing from both *inter alia* by its strongly convex form (viewed from the side the height of its elytra is not much less than their length), its rufo-testaceous prothorax and the sharply defined limit of the testaceous apical part of its elytra which is like that of *Platyomus Koebelei*. The specimens before me are probably males and it is likely that the head and front legs of the female are darker in color.

N. Queensland; taken by Mr. Cowley near Cairns; also by Mr. Koebele.

S. kamerungensis, sp. nov. (Mas.) Sat late ovalis; sat fortiter convexus; sat nitidus; pube albida densa erecta vestitus; niger, capite prothorace (macula basali angulata excepta) antennis palpis pedibus anticis tarsis omnibus abdomineque (parte antica mediana excepta) stramineis; capite prothoraceque subtiliter sat crebre, elytris dupliciter (sc. subtiliter et—pro hoc genere—sat fortiter) sat crebre punctulatis; prosterno medio longitudinaliter depresso; spatio depresso minus lato antice minus angustato utrinque subtiliter carinato; elytrorum sutura vix manifeste carinasa; lamellis abdominalibus haud integris. Long., $1\frac{1}{5}$ l.; lat., 1 l. (vix).

Fem. capite et pedibus anticis (tarsis exceptis) obscuris.

In my tabulation (vide supra) this species stands beside the preceding *(S. Cowleyi)*, but is easily distinguishable from it and all its allies by the pale straw color of its prothorax with a basal black spot in the form of a triangle with its apex pointing forward (in some examples the base of the triangle a little dilated on each side); this spot seems constant. The species is an exceptionally pretty one.

N. Queensland; taken by Mr. Cowley in the Cairns District, Kamerunga; also by Mr. Koebele.

S. mareebensis, sp. nov. Sat late ovalis; sat nitidus; pube albida densa erecta vestitus; niger, elytris ad apicem anguste rufo-marginatis, capite prothorace (hoc ad basin mediam infuscato) antennis palpis pedibus abdomineque stramineis; capite sparsius prothorace elytrisque confertim, subtiliter punctulatis; prosterno medio longitudinaliter depresso; spatio depresso minus lato antice angustato utrinque subtiliter carinato; elytrorum sutura postice subtilissime carinata; lamellis abdominalibus haud integris. Long., 1 l.; lat., $\frac{7}{10}$ l.

In my tabulation of *Scymnus* this species stands with *flavifrons* and *tenebricosus*,—differing entirely from both in its coloring, from the latter by its larger size, from the former by its finer puncturation, &c. It is probable that I have seen only the male of this species and that in the female the legs or some of them and perhaps the head are darker.

N. Queensland; taken by Mr. Cowley and Mr. Koebele near Mareeba in the Cairns District.

S. Styx, sp. nov. Late ovalis; sat nitidus; pube albida vix fulvescentis, erecta vestitus; niger, antennis palpis tarsisque rufescentibus; capite sat crebre minus subtiliter, prothorace crebre minus subtiliter, elytris minus crebre sat fortiter (pro hoc genere) punctulatis; prosterno medio longitudinaliter depresso; spatio depresso lato antice acuminato utrinque

subtiliter carinato; elytrorum sutura postice subtiliter carinata; lamellis abdominalibus haud integris. Long., $1\frac{1}{5}$ l.; lat., 1 l. (vix).

This species stands near *poonindiensis* and *Meyricki* in my tabulation, differing from both in its entirely black color and also in the stronger and less close puncturation of its elytra. It also resembles *S. brisbanensis*, but is larger, wider, and much more strongly punctured. The unique example before me is probably a female and it is not unlikely that the front tibiæ and perhaps the head of the male are rufescent.

Australia; exact habitat uncertain; taken by Mr. Koebele.

S. subclarus, sp. nov. (Mas.) Sat late ovalis; sat nitidus; pube albida erecta vestitus; niger, capite prothoracis lateribus antennis palpis tibiis tarsisque læte flavis, abdomine brunneo testaceo; capite prothoraceque sparsius subtiliter, elytris sparsius sat fortiter (pro hoc genere) punctulatis; prosterno medio longitudinaliter depresso; spatio depresso modice lato subparallelo utrinque subtiliter carinato; elytrorum sutura haud carinata; lamellis abdominalibus haud integris. Long., 1 l.; lat., $\frac{7}{10}$ l.

This species seems to oscillate between the groups of *poonindiensis* and *flavifrons* in my tabulation, as it is exactly of the size which I selected as the limit of those groups. It can however be at once separated from all the described species in both groups by the markings of its prothorax which consist of a bright yellow and very sharply defined marginal spot on each side. It comes near the preceding species *(S. Styx)* in the puncturation of its elytra but differs widely in color in less convex form and in its prothoracic puncturation. The unique type is a male; probably the female has darker front tibiæ and head.

Victoria; Alpine region.

S. subevanidus, sp. nov. Sat late ovalis; modice convexus; sat nitidus; setis erectis elongatis pallidis sparsim vestitus; niger, antennis palpis pedibusque testaceis; capite prothoraceque sat lævibus, elytris grosse sparsim punctulatis; elytrorum sutura haud carinata; lamellis abdominalibus haud integris. Long., $\frac{1}{2}$ l. (vix); lat., $\frac{3}{10}$ l.

The unique example of this extremely minute insect has its head and prothorax bent down in a manner that precludes a sufficient examination of its prosternum but as far as I can see the median part of the prosternum is longitudinally depressed as in the preceding species. Owing to the (in this genus) very exceptional sculpture of the elytra I deem it probable that a satisfactory dissection of specimens would lead to the removal of this

species from *Scymnus* but in the absence of such an investigation I find nothing to hinder its being placed there; it has the elytral epipleuræ without distinct foveæ, incomplete abdominal lamellæ, and comparatively small metasternal lamellæ of a *Scymnus*. Its eyes however are small for a *Scymnus* and a little strongly granulated,—but without being able to specify any other clearly distinctive character I do not think it seems desirable to found a new genus on these slight peculiarities alone. The insect bears a general resemblance to *S. vayans*, Blackb., but is at once distinguishable by its incomplete abdominal lamellæ, small eyes, and very coarse (fovea-like) sparse elytral puncturation. The long sparse elytral pubescence of this insect places it in my tabulation beside *S. notescens*, to which it bears little general resemblance.

N. Queensland; taken by Mr. Koebele near Cairns.

S. planulatus, sp. nov. Ovalis; minus convexus; sat nitidus; pube albida suberecta vestitus; piceo-niger, elytris ante apicem antennis tarsis et abdominis apice rufescentibus; capite sparsius distincte, prothorace crebre minus distincte punctulatis; prosterno æqualiter convexo; elytrorum sutura (parte basali excepta) subtiliter sat distincte carinata; lamellis abdominalibus haud integris. Long., 1 l.; lat., $\frac{7}{10}$ l. (vix).

The only previously described Australian *Scymnus* having the abdominal lamellæ incomplete and the prosternum not longitudinally carinate in the middle is *S. inusitatus*, Blackb., which apart from color differs from the present species *inter alia* by its much more convex form and stronger puncturation. The elytra of this insect bear an ill defined reddish blotch behind the middle but which does not attain either the lateral margin or the apex.

N.S. Wales; taken by Mr. Koebele at Paramatta, on *Eucalyptus*.

S. mitior, sp. nov. Sat late ovalis; sat convexus; sat nitidus; pube albida erecta vestitus; rufus, nigro-variegatus (colore nigro prothoracis vittam latam medianam antice abbreviatam, et elytrorum vittam suturalem postice abbreviatam circa scutellum dilatatam et pone medium ut fascia margines attingens dilatatam, formanti), sternis mediis et abdominis basi plus minusve infuscatis; capite prothoraceque subtiliter sat crebre, elytris crebre sed paullo minus subtiliter, punctulatis; prosterno æqualiter convexo; elytrorum sutura vix manifeste prope apicem carinata; lamellis abdominalibus integris. Long., 1 l.; lat., $\frac{7}{10}$ l.

In my tabulation of *Scymnus* this species stands beside *parallelus*, Blackb., from which it differs by its oval form, totally distinct markings, &c. The first ventral suture (though much

less strongly marked than the second) is less enfeebled in the middle than in most Australian *Scymni*.

N. Queensland; taken by Mr. Koebele near Cairns.

S. ambulans, sp. nov. Sat late ovalis; modice convexus; sat nitidus; pube albida erecta vestitus; brunneo-testaceus, elytris totis piceo-nigris, prothorace sternorum parte mediana femoribusque plus minusve infuscatis; capite sparsius distincte, prothorace elytrisque vix distincte, punctulatis; prosterno medio longitudinaliter depresso, spatio depresso minus lato antice angustato utrinque subtiliter carinato; elytrorum sutura vix manifeste prope apicem carinata; lamellis abdominalibus integris. Long., $1\frac{1}{5}$ l.; lat., 1 l. (vix).

In my tabulation of *Scymnus* this species stands beside *vagans*, Blackb., with which its very much larger size renders it quite incapable of confusion. The first ventral suture is less enfeebled in the middle than in most Australian *Scymni*.

N.S. Wales (Blue Mountains) and Queensland (Moreton Bay); taken by Mr. Koebele.

S. varipes, Blackb. Sat late ovalis; modice convexus; sat nitidus; pube fulvescenti erecta vestitus; niger, capite prothoracis angulis anticis summis antennis palpis tibiis, anticis tarsis omnibus abdomineque testaceis, tibiis intermediis rufescentibus; capite crebrius subtilius, prothorace elytrisque vix distincte, punctulatis; prosterno medio longitudinaliter depresso, spatio depresso minus lato antice sat angustato utrinque subtiliter carinato; elytrorum sutura postice subtiliter carinata; lamellis abdominalibus integris. Long., $1\frac{3}{5}$ l.; lat., $1\frac{1}{5}$ l.

Stands in my tabulation with the preceding and *S. vagans*,—differing from both *inter alia* by its larger size, and its undersurface black except the testaceous abdomen. The first ventral suture is less enfeebled in the middle than in most Australian *Scymni*.

This is the insect formerly mentioned by me as *Scymnodes varipes* (? var. of *S. Koebelei*). It has not however the antennæ or the metasternal lamellæ (both, in my opinion, essential characters) of *Platyomus (Scymnodes)* but of *Scymnus* and therefore notwithstanding its general facies of *Platyomus* I have no hesitation in placing it in *Scymnus*. I regret that when I formerly mentioned this insect I had not observed the form of the metasternal lamellæ in *Platyomus* (a character that seems to have escaped the notice of other authors also) and so erroneously referred this insect to that genus.

Queensland; taken by Mr. Koebele near Toowoomba on *Eugenia*.

S. yarrensis, sp. nov. Elongato-ovalis; minus convexus; sat nitidus; pube albida vestitus; nigro-piceus, capite prothoracis lateribus in utroque elytro vitta dorsali (vittis duabus his postice inter se conjunctis) antennis palpis pedibus abdomineque postice testaceis; capite sparsius distincte, prothorace crebre subtilius, elytris crebre fere subfortiter, punctulatis; prothoracis lateribus sat fortiter rotundatis; prosterno medio longitudinaliter depresso, spatio depresso minus lato antice minus angustato utrinque subtiliter carinato; elytrorum sutura postice subtilissime carinata; lamellis abdominalibus integris. Long., $\frac{4}{5}$ l.; lat., $\frac{1}{2}$ l. (vix).

This species stands in my tabulation beside *S. parallelus*, Blackb., which it closely resembles, differing from it chiefly in the much stronger puncturation (and much more strongly rounded sides) of its prothorax. Both these species bear much resemblance to the insect which I have called *Midus* (?) *pygmæus* but are at once separated from it *inter alia* by their first ventral suture being almost entirely effaced in the middle.

Victoria; Upper Yarra; presented to me by Mr. French.

NOVIUS.

N. simplicipennis, sp. nov. Sat late ovalis; minus convexus; sat nitidus; pubescens; niger, elytris labro antennis tarsis et abdomine (parte basali infuscata excepta) sanguineis; supra confertim subtiliter punctulatus. Long., $1\frac{2}{5}$ l.; lat., $1\frac{1}{10}$ l.

At once distinguishable from all its previously described Australian congeners *inter alia* by its coloring. *N. ruber*, Blackb., the only one of them having unicolorous red elytra, has head, prothorax, and legs also red, and is differently punctured.

Queensland; taken at Toowoomba by Mr. Koebele.

N. discoidalis, sp. nov. Breviter late ovalis; sat convexus; nitidus; pubescens; niger, elytrorum macula magna basin attingenti labro antennis tarsis abdomineque (hoc ad basin infuscato) brunneo-rufis; supra subtilissime sat crebre punctulatus.

Var. elytrorum macula ad apicem continua. Long., $1\frac{3}{5}$ l.; lat., $1\frac{3}{10}$ l.

More like the preceding than any other previously described Australian *Novius*, but I do not think it possibly an extreme var. of that species since, apart from its having very distinct elytral markings, it is a larger, broader, and more convex insect with elytral puncturation certainly both finer and less close. Even should it prove to be merely a form of a very variable species it seems to be a form to which it would be convenient

that a distinctive name should appertain. In one example before me the elytral spot extends along the base from close to the suture, includes the extreme front of the lateral margin, and narrows hindward till it ceases in a sharp point considerably behind the middle and a little nearer to the suture than to the lateral margin; the spot in the other example varies inasmuch as before it reaches a point it begins to dilate again and then spreads out over the whole of the apex. The convexity of this species is very similar to that of *N. cardinalis*, Muls.

Queensland; taken by Mr. Koebele near Toowoomba.

N. tripustulatus, sp. nov. Breviter late ovalis; fortiter convexus; nitidus; pubescens; niger, elytrorum macula magna humerali et macula communi apicali labro antennis tarsis abdomineque (hoc ad basin infuscato) rufis; supra confertim subtiliter punctulatus. Long., $1\frac{2}{5}$ l.; lat., $1\frac{3}{10}$ l. (vix).

Differs from the preceding species, apart from markings, by its still shorter and more convex build and by its closer less fine puncturation, which resembles that of *N. simplicipennis;* its puncturation is evidently less close and somewhat finer than that of *N. cardinalis*, Muls.

N. Queensland; taken by Mr. Koebele near Cairns.

N. limbatus, sp. nov. Breviter late ovalis (subcircularis); valde convexus; pubescens; sanguineus, capite (labro excepto) prothorace (lateribus exceptis) et elytris (margine lato laterali et apicali excepto) piceis; supra confertim subtiliter punctulato. Long., $1\frac{1}{5}$ l.; lat., $1\frac{1}{10}$ l.

Very distinct from the previously described Australian *Novii* by its color and markings. It is a very short, wide, and extremely convex species (viewed from the side its height is not much less than the length of its elytra). The puncturation of its elytra is (for a *Novius)* decidedly strong, being stronger than in any of the preceding three species and slightly stronger than in *N. cardinalis*, Muls., but it is not quite so close as in the last named species.

N. Queensland; taken by Mr. Koebele near Cairns.

CYCLOSCYMNUS.

C. concolor, sp. nov. Late ovalis, vix circularis; nitidus; valde convexus; setis brevissimis sparsis vix perspicue vestitus; totus niger; capite vix manifeste, prothorace sparsim obsolete, elytris sparsim subfortiter, punctulatis; prosterno medio vix longitudinaliter depresso; lamellis abdominalibus haud integris; segmento ventrali apicali crebre fortiter punctulato. Long., $\frac{3}{5}$ l.; lat., $\frac{1}{2}$ l.

Quite distinct from *C. minutus*, Blackb., by its entirely black color; also differs in its less circular form and somewhat greater convexity. I have before me two examples which differ from

the type in being evidently larger (long., $\frac{4}{5}$ l.) and in their apical ventral segment being less strongly punctured. I judge these differences to be sexual, and the larger examples to be females.

N. Queensland; taken by Mr. Koebele near Cairns.

C. minutus, Blackb. In describing this insect I called it "minus fortiter punctulatus." I think this phrase liable to convey the impression of its puncturation being feebler than it actually is and that "subfortiter" would be more accurate than "minus fortiter," the puncturation of the elytra being rather strong and well-marked for a *Scymnid*.

SERANGIUM.

S. bicolor, sp. nov. Late ovalis, subcircularis; nitidus; valde convexus; setis albidis sat elongatis sparsis vestitus; niger vel piceo-niger, capite antice antennis palpis pedibus abdomineque apicem versus fulvis, nonnullorum exemplorum (? immaturorum) corpore subtus toto fulvo; fere lævis. Long., $\frac{4}{5}$ l.; lat., $\frac{7}{10}$ l. (vix).

The uniform (except on the front of the head) black color of the upper surface at once distinguishes this species from all the previously described members of the genus.

N. S. Wales; taken by Mr. Froggatt near Maitland; specimens taken by Mr. Koebele in N. Queensland do not seem to differ from those sent by Mr. Froggatt.

BUCOLUS.

B. frater, sp. nov. Sat late ovalis; sat fortiter convexus; sat nitidus; pube albida brevi erecta vestitus; piceo-niger antennis tarsis abdomineque rufis; capite prothoraceque crebre, elytris minus crebre, subfortiter punctulatis. Long., $1\frac{3}{5}$ l.; lat., $1\frac{1}{5}$ l.

This species is closely allied to that which I described as *B. convexus*, differing from it chiefly by its prothorax concolorous with the general surface and the very evidently less close puncturation of its elytra. I doubt whether these two species will remain permanently in *Bucolus;* indeed I should like to propose a new generic name for them, but cannot find any distinctive structural character that seems to me of sufficient importance for the purpose. They have the produced prosternum, the externally angular tibiæ, the strongly foveolate epipleuræ and the peculiar abdominal *lamellæ* of *B. Fourneti*, Muls. The last-named however differ slightly; those of *B. Fourneti* do not reach the apex of the first ventral segment and therefore are not confused with the first ventral suture; when this is the case, in most *Coccinellidæ* the lamellæ are complete but in *Bucolus* the whole lamella becomes confused externally with the general surface and its

external margin is scarcely traceable. In the present species the external margin, however, is distinctly returned *towards* the front margin of the basal segment but terminates abruptly before reaching it. The chief differences however between these species and *B. Fourneti* consist in their much greater convexity (the latter being an exceptionally depressed *Coccinellid)* and their much narrower and more horizontal elytral epipleuræ. These differences give them an extremely different facies but nevertheless seem scarcely satisfactory characters for founding a new genus. Their general appearance is that of *Cryptolæmus Montrouzieri* but that insect has non-foveolate epipleuræ, very different abdominal lamellæ, &c.

Queensland; taken by Mr. Koebele at Nerang.

B. posticalis, sp. nov. Sat late ovalis; sat fortiter convexus; sat nitidus; pube albida brevi erecta vestitus; piceo-niger, capite prothoracis lateribus elytrorum parte apicali tertia antennis palpis pedibus abdomineque rufis, nonnullorum exemplorum (? immaturorum) corpore subtus toto rufo; capite sparsius subtilius, prothorace crebre subtilius, elytris crebre subfortiter, punctulatis. Long., $1\frac{1}{2}$ l.; lat., $1\frac{1}{5}$ l. (vix).

This species is congeneric with and closely allied to the preceding *(B. frater)* and *B. convexus*, Blackb., but like them it seems dubiously placed when associated with *B. Fourneti*, Muls. The bright red color of the apical third part (or even a trifle more) of its elytra distinguishes it at once from its described allies. Its puncturation is much like that of *B. convexus* from which it differs by its considerably more convex form as well as in color (sc. red head and legs, prothorax black except at the sides, elytra partly red).

N. Queensland; taken by Mr. Koebele near Cairns.

RHIZOBIUS.

R. Crotchi, sp. nov. Ovalis; minus convexus; sat nitidus; pube fulva suberecta vestitus; rufus, elytris totis fusco-nigris; capite prothoraceque subtilius vix crebre, elytris subfortiter sat crebre, punctulatis; prosterno medio longitudinaliter depresso; spatio depresso minus lato, antice angustato, utrinque subtiliter carinato.

Maris segmento ventrali 5° bifoveolato, fovearum interspatio alterutræ foveæ latitudine æquali. Long., $2\frac{1}{2}$ l.; lat., $1\frac{3}{5}$ l.

In my tabulation of *Rhizobius* (Tr. R.S., S.A., 1892, pp. 257, &c.) this species stands next to *R. Bakewelli*, Crotch., thus—"EEE. Elytra unicolorous . . . *R. Crotchi*, Blackb." It is much like *R. Bakewelli* but besides the absence of elytral marking it is smaller and has the foveæ on the fifth ventral segment

of the male much more widely apart. Compared with *R. major*, Blackb., it is much more finely punctulate.

Queensland; taken near Port Mackay.

R. gosfordensis, sp. nov. Elongato-ovalis; sat convexus, elytris pone scutellum fere subgibbosis, sat nitidus; pallide fulvo-pubescens et setis erectis sparsim vestitus; rufescens, prothorace (margine antico et laterali anguste dilutiori excepta) fere nigro, elytris femoribusque picescentibus; capite prothoraceque minus fortiter subcrebre, elytris vix fortiter sat crebre, punctulatis; his in spatio communi paullo pone scutellum posito sublævibus; prosterno medio longitudinaliter depresso; spatio depresso minus lato, antice sat angustato, utrinque subtiliter carinato. Long., $1\frac{7}{10}$ l.; lat., $1\frac{1}{10}$ l. (vix).

This species is very near *R. speculifer*, Blackb., beside which it must stand in my tabulation of the genus. It is a notably narrower and more elongate insect with its elytral puncturation distinctly less strong.

N. S. Wales; taken by Mr. Koebele near Gosford.

R. discipennis, sp. nov. Breviter late ovalis; valde convexus, elytris pone scutellum fere subgibbosis; sat nitidus; pube albida suberecta et setis longioribus magis erectis vestitus; niger vix subæneus (nonnullis exemplis rufescentibus) antennis palpis tibiis tarsis abdomineque dilutioribus (nonnullorum exemplorum pedibus totis, vel etiam corpore subtus toto, pallidis); capite crebre distincte, prothorace crebre sat aspere, elytris sparsius subfortiter, punctulatis; his in spatio communi paullo pone scutellum lævibus, hoc spatio utrinque puncturis fortiter impressis lineatim positis marginato; prosterno medio longitudinaliter depresso; spatio depresso antice acuminato, utrinque subtiliter carinato. Long., $1\frac{1}{10}$ l.; lat., $\frac{4}{5}$ l.

In my tabulation this species must stand with the preceding species (*R. gosfordensis*) and *R. speculifer* from which it is at once distinguishable by the common unpunctured space on its elytra being bordered on either side by a well-defined line consisting of some of the largest punctures on the elytra.

N. Queensland; taken by Mr. Koebele near Cairns.

R. eminens, sp. nov. Sat late ovalis; fortiter convexus; sat nitidus; setis subtilibus sat elongatis erectis vestitus; rufus, elytris læte cœruleis, sterno medio subinfuscato; capite subcrebre sat fortiter, prothorace vix crebre sat fortiter, elytris sparsim fortiter, punctulatis; his in spatio communi paullo pone scutellum lævibus, hoc spatio utrinque puncturis lineatim positis marginato; prosterno medio longitudinaliter

depresso; spatio depresso antice acuminato, utrinque subtiliter carinato. Long., 1 l.; lat., $\frac{7}{10}$ l.

In my tabulation this species stands beside *R. cæruleus*, Blackb., from which *inter alia* its very different puncturation readily separates it. Apart from color it is near *R. discipennis* differing *inter alia* by the stronger and much less close puncturation of its elytra.

N. Queensland; taken by Mr. Koebele near Cairns.

R. subaustralis, sp. nov. Oblongo-ovalis; minus convexus; sat nitidus; pube brevi albida sat erecta vestitus; rufus, elytris (margine laterali sat anguste rufo excepto) piceo-nigris; capite prothoraceque leviter (nec subtiliter) sat crebre, elytris sat fortiter sat crebre æqualiter nec rugulose, punctulatis; prosterno æqualiter convexo. Long., 2 l.; lat., $1\frac{3}{10}$ l.

This species is closely allied to *R. australis*, Blackb., but is considerably smaller and *inter alia* its elytra are evenly and not at all rugulosely punctulate (in *R. australis* large and small punctures are crowded together in a manner that gives an appearance of rugulosity).

N. Queensland; taken by Mr. Koebele near Cairns.

ABSTRACT OF PROCEEDINGS

OF THE

Royal Society of South Australia,

1894-95.

ORDINARY MEETING, NOVEMBER 6, 1894.

Prof. R. TATE (President) in the chair.

EXHIBITS.—Dr. STIRLING exhibited photographs of "Meridional Ant-hills" taken by Mr. Foelsche at Knuckey's Lagoon, N.T., some miles south of Palmerston, N.T., together with some specimens of the ants. The ant-hills are so called from the constant disposition of their long axes in a northerly and southerly direction. These structures at this locality are from seven to eight feet high and about six feet broad, with a concave surface to the west, and a convexity to the east. Mr. Saville Kent, Inspector of Fisheries, W.A., has noticed similar ant-hills near Roebuck Bay, W.A.; and they were also observed by the Horn Expedition at Burt Plains in front of the Macdonnell Range. J. G. O. TEPPER, F.L.S., referred to the occurrence of *epidote* and garnet rock in the Barossa Ranges, S.A., near Tanunda, and submitted an analysis of the same made by G. Goyder, jun, the Government Analyst. (See Annual Report Sch. Mines, Adelaide, for 1894, p. 147.) Also a sample of a kind of earth eaten by the aborigines of Roebuck Bay, W.A., and obtained from the ant-hills in the neighbourhood. (For analysis by G. Goyder, jun., the Government Analyst, see op. cit., p. 146.)

PAPER.—"Remarks on the Native Tongues in the District of Port Darwin, N.T.," by T. A. PARKHOUSE, formerly accountant and pay-master, S.A. Gov. Railways, Port Darwin.

ORDINARY MEETING, DECEMBER 4, 1894.

Prof. R. TATE (President) in the chair.

EXHIBITS.—Prof. TATE exhibited a specimen of the Australian Roller *(Eurystomus australis)* from Walgett; also photographs

of the Horn Exploring Expedition. J. G. O. Tepper, F.L.S. showed a collection of mantids from the Museum, containing specimens from the Horn Exploring Expedition. Three species from the latter were probably new to science, and belonged to the genus *Haania*. W. Howchin, F.G.S., laid on the table a piece of lignite with bone-breccia from Montefiore, S.A., at a depth of 45 feet. Also an obsidian bomb shaped into a cutting instrument by the aborigines.

Papers.—"Results of Experiments on the Solubility of Gold by Potassium Cyanide and certain Double Cyanides," by George Goyder, jun., Government Analyst. "Additions to the Flora of South Australia," by Prof R. Tate.

Ordinary Meeting, April 2, 1895.

Prof. R. Tate (President) in the chair.

Exhibits.—Prof. Tate, on behalf of the Conservator of Water, exhibited fossil fruits from a depth of 350 feet at the lake crossing, Lake Callabonna. The fruits belonged to the extinct genus *Celyphina*, N.O. *Proteaceæ*. The species was distinct from *C. McCoyi*, the only known species. The stratigraphical data might locate it as either Cretaceous or Pliocene. Also older tertiary fossils from Victoria, some still retaining their color markings, and in the case of *Trigonia Howitti* the ligament was well preserved. J. G. O. Tepper, F.L.S., showed the Orthoptera of the Horn Exploring Expedition. Lawrence Birks, B.Sc., laid on the table some Silurian fossils gathered from the Browning series, N.S.W., by J. Mitchell, amongst which were two specimens of *Encrinus Mitchelli*.

Papers.—"Description of the New Element, *Argon*," by Prof. Rennie, D.Sc. "New Facts relating to the Glacial Features at Hallett's Cove," by W. Howchin, F.G.S. "Additions to Australian Coleoptera," by Rev. Thos. Blackburn, B.A.

Ordinary Meeting, May 7, 1895.

Prof. R. Tate (President) in the chair.

Exhibits.—W. Howchin, F.G.S., exhibited a collection of *zeolites* and other inclusions from the basalts of Victoria, there being varieties of *chabazite*, *phacolite*, *phillipsite*, *mesolite*, *calcite*, *ferrocalcite*, and a very handsome specimen of *aragonite*. The minerals had been collected by the Rev. Glanville Ramage. J. G. O. Tepper, F.L.S., exhibited a large specimen of *Polyzosteria obscuroviridis* with egg-case from Beltana; also *Danais ardrippens* from Gawler and the New Hebrides (Rev. W. Gray); also *Van-*

essa urticæ from the New Hebrides. A. ZIETZ, F.L.S., showed a specimen of *Telephusa transversa* from Ockenden Creek. It is found also in the Finke and Cooper Creeks.

BALLOT.—JOHN H. COOKE was elected a Fellow, and JOHN B. CLELAND an Associate.

PAPERS.—"Petrological Notes," by J. MOULDEN. "S.A. *Muricidæ* and *Fusidæ*," by J. C. VERCO, M.D.

ORDINARY MEETING, JUNE 4, 1895.

Prof. R. TATE (President) in the chair.

The President reported that a suggestion from the Mayor of Adelaide to hold a conjoint Conversazione of the Scientific and Art Societies towards the end of the present year, had been considered at a special Council meeting. It was recommended to the favourable notice to the Society. The President and the Hon Secretaries were appointed to represent the Society at any meetings that might be held to carry the project into effect.

EXHIBITS.—W. HOWCHIN, F.G.S., exhibited a very fine specimen of nested quartz crystals from the quartzite quarries at Mitcham; also a pophyritic erratic from Hallett's Cove, the point of interest of which was the formation of pseudomorphic quartz in cavities caused by the dissolving of orthoclase feldspar.

PAPERS.—Mr. C. HEDLEY communicated a "Note on *Arca domingensis*," in which he adds to the list of synonyms furnished by Mr. Brazier, Proc. Lin. Soc., N.S. Wales, p. 145, 1894, the following names:—*A. donaciformis*, Rv.; *A. pholadiformis*, C B. Adams; and *A. laminata*, Angas. Prof. TATE stated that *A. MacCoyi*, Tenison Woods, is the same as *A. laminata*, Angas; and that Mr. Cooke, Ann. Mag. Nat. Hist., Vol. xviii., p. 94, 1886, considers that there are three species of the type of *Arca plicata*, Chem.—*gradata*, Brod. and Sow., is the W.-American form; *Domingensis* and *squamosa*, Lamarck, is the W.-Indian form; and *divaricata*, Sowb. (=*plicata*, Chem.), is the E.-Indian form [and the one represented in Australasian seas]. "Supplementary Notes on Tertiary Geology in Victoria," by Prof. R. TATE and JOHN DENNANT, F.G.S. "Characteristics and Origin of the Larapintine Flora," by Prof. R. TATE.

ORDINARY MEETING, JULY 2, 1895.

Prof. R. TATE (President) in the chair.

EXHIBITS.—Prof. RENNIE, D.Sc., exhibited for Mr. Turner a portion of a nodule of barytes occurring in the clay slates at Brighton.

Papers.—"Anthropological Notes," by K. Dahl. "The Carabidæ of Lake Callabonna," by T. G. Sloane. "Cannibalism as it is practised on Tanna, New Hebrides," by Rev. W. Watt, communicated by Rev. W. Gray.

Ordinary Meeting, August 6, 1895.

Prof. R. Tate (President) in the chair.

Exhibits.—J. G. O. Tepper, F.L.S., laid on the table a case of Orthoptera illustrating the family of *Truxalidæ*, or helmet locusts; also an Australian species of *Coryphistes*, which inhabits scrub and forest lands, feeding on the leaves of the eucalypts. The *Truxalidæ* are carnivorous and feed on isects.

Ballot.—Edwin Ashby was elected a Fellow.

Papers.—"Notes on Blattariæ," by J. G. O. Tepper, F.L.S. "Carboniferous Foraminifera from Western Australia," by W. Howchin, F.G.S. "Two new species of Cretaceous Foraminifera," by W. Howchin, F.G.S. "Fossil Plant Remains from Leigh's Creek." by Robert Etheridge, F.G.S.

Ordinary Meeting, September 3, 1895.

Prof. R. Tate (President) in the chair.

Exhibits.—Prof. Tate exhibited specimens of *Trigonia Tatei* (Pritchard) from the Eocene of the Moorabool Valley; and an example of an undescribed species from the Miocene of the River Murray Plain, which he named *T. Murravica*. It is allied to *T. Howitti*, McCoy, but the radial costæ are much broader than the interspaces and coarsely subnodulose. Also two species of ammonites, showing some affinity to the Cretaceous species, *A. varicosus*, of Europe. They were given to Dr. Stirling when at Palmerston in 1891, as coming from near that place. Prof. Tate exhibited specimens of *Cryptodon flexuosus*, Montague, dredged at Port Esperance, Tasmania, by Mr. Harrison. Subsequently, November 28, 1894, Mr. Brazier communicated the same information to the Linnean Society, Sydney (see Proc., Vol. ix., p. 725, 1895), and further intimated that he had collected the species off Port Stephens, N.S.W., as early as 1874. The discovery of this European species in Tasmanian waters belongs, however, to Mr. Petterd, who submitted to the speaker about twelve years ago specimens taken off Brown River, on which I reported—"*Cryptodon* sp., but slightly different from *C. flexuosus* of European seas." "The discovery of a closely allied species in the Eocene beds at Muddy Creek may opportunely be recorded now. The fossil species, which I name Cryptodon su b

FLEXUOSUS, differs in the following particulars—the antero-dorsal line is deeply concave, the anterior side is more produced, and the antero-ventral margin is truncatedly rounded; the shell is less convex, the posterior angulation is only moderately elevated, and in consequence the posterior area is flatly convex and its margin hardly at all insinuate. Diameters—Umbro-ventral, 4; ant-posterior, 3.75 mm. (A right valve.)"—R.T.

PAPER.—"The Cerebrum of *Notoryctes typhlops*," by G. E. SMITH, M.D., communicated by Dr. STIRLING.

ANNUAL MEETING, OCTOBER 1, 1895.

Prof. R. TATE (President) in the chair.

CONGRATULATION.—The President read a telegram from Baron F. von Mueller conveying his best greetings to the Society at its anniversary meeting closing a brilliant year's research.

BALLOT.—Rev. GRANVILLE RAMAGE was elected a Fellow.

PAPERS—"Descriptions of New Coleoptera," by Rev. THOMAS BLACKBURN, B.A. "Descriptions of New Species of Mollusca," by J. C. VERCO, M.D.

ANNUAL REPORT.—The Annual Report and balance-sheet were read and adopted.

ELECTION OF COUNCIL.—President, Walter Howchin, F.G.S.; Vice-Presidents, Prof. R. Tate and Rev. Thomas Blackburn, B.A.; Hon. Treasurer, Walter Rutt, C.E.; Hon. Secretaries, W. L. Cleland, M.B, and W. B. Poole; Members of Council, Prof. Rennie, D.Sc., E. C. Stirling, C.M.G., M.D., F.R.S., S. Dixon, M. Holtze, F.L.S., J. S. Lloyd, and Mr. W. H. Selway.

ELECTION OF AUDITOR.—D. J. Adcock was elected Auditor for the ensuing year.

PRESIDENTIAL ADDRESS.—The retiring PRESIDENT (Prof. R. Tate) gave his Presidential address.

ANNUAL REPORT.

The Council has to report that the scientific work of the Society has been carried on successfully during the past year, and that in the Proceedings of the Society for 1894-95 will appear various important papers bearing on different branches of natural science. Amongst these may be mentioned further contributions to the botany of South Australia, both recent and fossil; descriptions of new shells and a more elaborate study of species previously known; continued contributions to entomology; geological papers relating to the marine tertiaries of Australia and the glacial features at Hallett's Cove; descriptions of new foraminifera; and a study of the brain of notoryctes. An important vocabulary of the natives of Port Darwin has also been added to those already known, and a description of one of the jealously-guarded rites of the aborigines of Australia.

The Council has also much pleasure in reporting that Sir Thomas Elder has furnished the necessary funds for completing the third and final part of the volume which has been dedicated to recording the scientific results of the Elder Exploring Expedition. This part will contain the botanical and anthropological results of the Expedition, and will be profusely illustrated, making with the previous two parts a valuable contribution to the scientific exploration of Australia.

During the past year three new Fellows and one Associate have been elected; one Corresponding Member and one Fellow have died; and four Fellows have resigned.

The obituary includes the name of T. H. McGillivray, M.R.C.S., Eng., F.L.S., of Sandhurst, Victoria, a Corresponding Member of this Society. He was elected in 1889, and was well known for his contributions to Australian Polyzoa, recent and tertiary. A list of the Polyzoa from the Cape Otway beds was communicated by him to this Society only a few weeks ago, and in Vol. XII. of the Society's Proceedings is published a list of South Australian Polyzoa furnished by him. His *opus magnum*, the Tertiary Polyzoa of Victoria, is in course of publication under the auspices of the Royal Society of Victoria.

It is with regret also that the Council has to refer to the death of one of its oldest Fellows in the person of George Mayo, F.R.C.S., Eng., who was elected in 1853, the year in which the Society was started under the name of the Philosophical Society

of South Australia. It may be interesting to note that Dr. Garran, of Sydney, an Hon. Fellow, and Mr. Robert Kay, of the Public Library, Adelaide, a Fellow, are the only survivors of that year's election.

The membership of the Society consists at the present date of 11 Hon. Fellows, 73 Fellows, 15 Corresponding Members, and two Associates.

Two new exchanges with learned Societies and publishers have been made, namely, the University of California and the Museum of Natural History, Paris.

The library of the Society continues to be enriched by the receipt of scientific periodicals from all parts of the world, and the Council has had some forty volumes of these bound during the past year, to facilitate their being utilised by the Fellows and Members. On the shelves of this Society are to be found scientific serials not easily met with elsewhere. It would afford the Council much satisfaction if this branch of the Society's usefulness was utilised to a greater extent. The running index kept by the Hon. Sec., allows of easy reference to any recent additions.

The Anniversary Address of the President Professor Ralph Tate.

Without preamble, I will beg your indulgence whilst I endeavor to briefly treat of

Some Work of the Society since 1876.

The past history of this Society may be divided conveniently into two periods—(1) that from its inception in 1853 to 1876, and (2) that from 1876 to the present. During the latter period monthly meetings have been held without intermission, save for each summer recess, and publication of its Proceedings have been regular. It was during my presidency that a better organization was adopted, which has eventuated in the creditable position that the Society now holds among similar institutions in the Australasian Colonies. Now, at the close of a second term of office I may be pardoned if I speak with pride of the results achieved during the past eighteen years.

It was at about the commencement of the second stage in the life of the Society that it was remarked, "Why contribute to such an obscure publication?" But, despite the implied reproach, the small band of workers at that time was not to be deterred from striving to make this Society an exponent of science in South Australia, believing that with judicious nursing this scientific weakling might receive increasing support by the advent of other laborers, and eventually attain to some measure of independence. This expectation has for some few years been realised, as may be gauged by the demand for our publications and the many applications made by others than Fellows to use our Transactions as a channel of communication to scientific readers. For this achievement we owe a debt of gratitude to the loyalty of several contributors whose papers might have adorned the publications of Societies of the highest standing, and who thereby ran the risk of self-condemnation to comparative obscurity. "All's well that ends well;" for we have passed the critical stage of our existence, whilst the work of the future can only be curtailed by want of pecuniary means. Indeed, already have some papers been diverted into other channels for publication through this cause.

The subjects which have engaged our attention are diversified, whilst the many papers on Zoology, Anthropology, Geology, and Botany contained in our volumes of Transactions are results which close a past of unwarranted belief in the incapabilities of

the Society to advance technical knowledge and open a future of extended researches boundless in fertility of problems and of unknown possible effects in the material advancement of this continent. These results are the outcome of individual effort, and it is not possible to estimate the value that might have been attained if the separate workers had been controlled by an organization; and I am strongly impressed that a federation of the scientific bodies in Australia could bring about at the least a scheme for the organization of scientific publication with advantage to all concerned. The Association for the Advancement of Science exercises such organising power, not deliberately but unconsciously; and in doing so seeks to protect the individual or a people from the intellectual blood-sucking propensities of a neighbor. The fact that South Australia accepts such a degrading position in relation to its Agriculture and Botany with Victoria, or to its Geology with New South Wales, is in evidence of the desirability of an interprovincial organization which would exercise a wholesome influence on the progress of science. The fact that Victoria and New South Wales have peculiar gifts and talents makes co-operation all the more indispensable to the less fortunately situated of their sisters; each should no longer continue to profit by the experience of the other without undertaking some share of the task.

So far back as 1879 I ventured to express the opinion that the science of this Society was largely, perhaps too largely, that which is comprised under the term Natural History, and with a tendency to the technique of the subject rather than the philosophical study of it. This implies that the early history of this Society represents a time when scientific workers were few, and of the "good-all-round" type of scientist, and therefore popular expositors; that gradually specialization in scientific pursuits has been growing, either by the older workers narrowing their sphere of observation, or by the advent of new compatriots already specialists. But the facts of identification and distribution are fundamental, and to the accumulation of which the Society has almost exclusively given its attention during the last fifteen years or more. In evidence, I offer a summary of the work done by the Society in the domain of diagnostic Natural History; this does not take into account a very considerable number of species which have been either redescribed or better defined; but at the same time I express no opinion of the validity of the genera and species diagnosed, except for those which I am personally responsible. Our competitor for first place in this direction among the Australasian Scientific Societies is the Linnean Society of New South Wales; but this Society comes in a good second in the race for distinction.

Summary of Diagnostic Natural History

(Published in the Transactions of the Royal Society, South Australia, inclusive of vol. XIX., 1895).

	New Genera.	New Species.
Zoology—		
Mammalia	1	1
Reptilia	—	7
Crustacea	1	6
Insecta—		
Coleoptera	85	1,080
Lepidoptera	24	338
Hymenoptera	—	3
Orthoptera	18	122
Coccidæ	—	16
Gastropoda and Lamellibranchiata ...	2	131
Polyzoa	—	12
Total	131	1,716
Botany—		
Phanerogamia	3	51
Vascular Cryptogamia	—	1
Total	3	52
Palæontology—		
Older Tertiary	9	591
Cretaceous	—	2
Jurassic	—	1
Cambrian	—	13
Total	9	607
Mineralogy	—	1
Totals	143	2,376

Fellows might like to be reminded of the more important achievements in other departments of Natural Science, for it is out of the question to attempt to deal comprehensively with all the subjects which have been published by the Society. In Geology, we claim to have elaborated a Cambrian fauna, and as a consequence to have determined an Archæan or preCambrian group of rocks, thus adding those two names to the table of the stratified rocks of Australia; to have determined the occurrence of strata over a large area in Central Australia yielding Silurian fossils, which are of a type hitherto unrecognised on this continent; to have geologically mapped a vast tract of interior country between longitudes 133° to 120° and latitudes 32° to 36°; to have classified the marine Tertiaries on the basis of a comparison of their molluscan faunas with existing species; to have brought to notice the first clear evidence of the pre-existence of a glacier at low elevations and the determination of its pre-Miocene age.

Anthropology has received a large share of attention, and

several contributions dealing with the language and customs of some interior and northern races of the Australian aborigine have been published.

Comparative Anatomy is represented by papers dealing with the osteology, myology, and neurology of that most interesting marsupial, *Notoryctes typhlops*.

Lastly, the papers on the chemical properties of certain botanical products are the outcome of careful and original research work.

And now, if your patience be not already exhausted, I will refer to

SOME RECENT ADVANCES TO OUR KNOWLEDGE OF NATURAL HISTORY OF AUSTRALIA.

1. On a Recent Classification of the Australian Land Mollusca.

The appearance of Dr. Cox's Monograph of Australian Land-shells, 1868, with its copious illustrations, brought the study of this department of Natural History within easy reach, and till recently has been a *vade mecum* to Australian workers. But of late years the number of species has been nearly doubled, and important advances have been made in their classification. The helix-like shells which were then known to Cox are included by him under one generic denomination, that of *Helix*, though he employed sectional names in accordance with Pfeiffer's nomenclature, which is based on the classification proposed by Albers and Von Martens. Up to this time the classification was based solely, as regards the Australian forms, on conchological characters, or on characters derived from the study of some special organ. But as far back as 1873, Von Martens ("Critical List of the Mollusca of New Zealand," p. 8) remarked that "this genus *(Helix)*, which has been formerly determined by the aspect of the shell only, has during late years been more narrowly circumscribed by the peculiarities of the masticatory and generative organs. As no New Zealand species has hitherto been the subject of anatomical researches, we cannot say how many, and indeed if any, of those which have been described as New Zealand species of *Helix* will remain in that genus as it is now understood." During the years 1880–1882 Professor Hutton communicated several papers to the New Zealand Institute dealing with the anatomy of the land snails of that region, and established some new genera; but later Messrs. Hedley and Suter have separately and conjointly made exact and minute study of the various elements of the morphological characters of the Australasian helicoid snails, and have thereby demonstrated that they exhibit structural dif-

ferences from the typical *Helix* in varying degrees of divergence. A sound arrangement and classification of our numerous species of so-called *Helices* has been long felt, as the classification of Albers, revised by Von Martens, which has been in vogue for the past thirty years, has proved inadequate to the requirements of the systematist. It is, therefore, we hail with satisfaction the appearance of Mr. Pilsbry's "Guide to the Study of Helices," included in vol. IX., second series, of Tryon's Manual of Conchology, 1894–5, which is highly meritorious and will prove of exceeding usefulness. It furnishes us with a classification based on the extensive study of the soft parts—not upon the modification of a single organ, but all the organs of the animal are taken into account.

The author divides the bibliography of the subject into five epochs, commencing with that of Linnæus, and ending with the fifth, introduced by the publication of the second edition of Albers' "Die Heliceen" by Von Martens. Pilsbry modestly subordinates his work to this fifth epoch; but those best familiar with his highly valuable services as a systematist will not doubt the epoch-making importance of his "Guide to the Study of Helices."

It is not desirable to attempt a review of the whole work, but so much of it as concerns the Australian fauna may be summarised. The classification is based upon, to quote the author:—

Organs of protection (shell, mantle, integument of body).
Organs of locomotion (foot, pedal grooves, tail gland).
Organs of reproduction (genitalia, comparative size of eggs, &c.).
Organs of nutrition (jaw, teeth, intestinal tract, kidneys, &c.).
Nervous system, including sense-organs, such as tentacles, &c.

The Australian snails with a helicoid shell belong to the following families:—

I. Without jaw. RHYTIDÆ
II. With jaw.
1. Foot-margin defined by a pedal groove; peristome sharp.
a. Marginal teeth with narrow, elongated, basal plates, and either 1-cuspid and aculeate or bicuspid. Tail gland often present, sole of foot frequently tripartite. ZONITIDÆ.
b. Marginal teeth with wide, short basal plates, with one or several cusps, the outer cusp never elevated on the middle cusp. Shell opaque, usually flame-colored, and rib-striate. ENDODONTIDÆ.
2. No pedal grooves, no tail-gland. Dentition as in *Endodontidæ*. Peristome usually expanded or reflected. HELICIDÆ.

Mr. Pilsbry's work treats only of the *Endodontidæ* and *Helicidæ*, but a companion volume dealing with the other families is promised. To bring this important work more fully to the notice of malacological students in Australia, I have prepared a full synopsis of the genera belonging to the Australian fauna which are comprised in the two families. Without any desire to be critical, I may mention that the limits of the various genera and their mutual relationships may need to be modified with our increasing knowledge of the anatomy of the various species; as it should not be forgotten that more than half of our species are generically located by conchological characters only. The acceptance of Pilsbry's classification opens to us a wide and interesting field of research which is within the reach of each worker, and desiderrated knowledge actually awaits him at his own door. Should any collector, however, think himself unprepared to investigate the anatomy of any snail, he would render good service to malacological science by forwarding his material to Mr. Charles Hedley, of the Australian Museum, Sydney—to whom Mr. Pilsbry acknowledges his great indebtedness in this connection. Moreover, this classification, which expresses the best of our ideas of the relationships of genera and species, provides reliable data for the correlation of local faunæ, and for the solution of various problems connected with geographical distribution and origin.

The Family Endodontidæ is intermediate between *Zonitidæ* and *Helicidæ* in its characters, but is of more primitive origin than either, as indicated by its unspecialised jaw, teeth, genitalia, and shell; indeed, the oldest land-snail, *Zonites priscus* of the Coal Measures of Nova Scotia, is considered by Pilsbry as a probable member of the genus *Pyramidula*. The family has a world-wide range, though very scarce in the tropics. Its present headquarters are in Austro-Polynesia, which furnish 333 of a total of 523 species. Australia and Tasmania possess 78 species distributed in the following genera:—*Laoma* 9, *Flammulina* 22, *Endodonta* 47.

The Family Helicidæ is divided by Pilsbry into five groups, which, arranged in their numerical order, differ from one another in the increasing complexity of the genital organs. Tribe 1, Protogona, with genitalia of the lowest type, is not represented in Australia. Tribe 2, Macroogona, with simple genitalia, but the vas deferens has an epiphallus, contains six Australian and Tasmanian species. Three belong to the monotypic genera *Pedinogyra*, *Anoglypta*, and *Caryodes;* and three to *Panda*, which is exclusively Australian. A still further advance is made in Tribe 4, Epiphallogona, the genital system of which has an epiphallus and flagellum on the penis; but there is no dart sack or other accessory appendages on the female side as in the highest

developed Helices constituting Tribe 5, Belogona, which is absent in Australia. To Tribe 4 belongs the large number of our helix-like shells (144) having an expanded or reflected lip. They are grouped into several genera, based on shell characters only. This group is absent in Tasmania, New Zealand, and New Caledonia, but ranges northward to New Guinea, Southern Asia, and Japan. In America it covers West Indies, Northern South America. The distribution of the Australian examples of epiphallogonous Helicidæ is as follows :—

Chloritis in its wide acceptation extends from North Australia to Southern China, but its typical forms belong to the Malay-Papuan region. The Australian species, 14 in number, are divergent forms, and included in the Section *Austrochloritis*, with which are associated a few Papuan species.

Planispira is an Indo-Malayan and Papuan genus, but the aberrant group, *Angasella*, is restricted to Australia.

Angasella, containing nine species, is characteristic of the Eremian region, whilst the subgroup, *Trachiopsis* (11 species), is confined to the costal tracts of N.W. and N.E.

Thersites is almost wholly Australian, strictly Austro-Papuan, a few species occurring in Papua and adjacent islands.

Thersites (sensu stricto) comprises two species inhabiting the coast-region of subtropic Queensland and New South Wales.

Glyptorhagada contains seven species, confined to South Australia, but dominant in the Eremian region.

Badistes has 42 species distributed throughout the subtropic and temperate parts of the continent, and extending from the coast to the dry interior.

Sphærospira, with 47 species, inhabits Queensland, with a few forms in Papua, being replaced southward by *Badistes* and westward by *Xanthomelon*.

Hadra, as now restricted, consists of three North Queensland species.

Xanthomelon comprises six species, five of which inhabit Queensland and one Arnheim Land.

Rhagada includes ten species belonging to the coast and islands of North Australia, chiefly North-West, and of four species in the islands north of Timor Sea.

Papuina is a large and exclusively arboreal genus inhabiting Papua, the Solomon Archipelago, the Moluccas, but having its southern limit in North Queensland, where it is represented by seven species.

SYNOPSIS OF THE GENERA OF ENDODONTIDÆ.

Group Polyplacognatha.

Jaw composed of numerous squarish plates connected by membrane only; side teeth all bicuspid; no mucus gland at tail.
Shell subtrochiform, keeled, at least in young, usually flame-painted. [Laoma.]
Aperture of shell without teeth or folds.
Section Phrixgnathus.

Group Haplogona.

Jaw composed of overlapping laminæ, partially soldered together or solid, and vertically striated.
Tail with a mucus gland; aperture without folds.
[Flammulina.]
Jaw arcuate, with flat plaits.
Central tooth a short mesocone, ectocones obsolete, laterals with a short ectocone, which disappears on the marginals, leaving a long oblique mesocone only.
s.g. Thalassohelix.
Marginal teeth low, wide, and multicuspid.
s.g. Hedleyconcha.
No mucus gland at tail.
Aperture armed within with teeth or plates.
[Endodonta.]
Shell rounded at periphery, outer lip with folds.
Section Thaumatodon.
Aperture without teeth; shell depressed, convex, flat, or concave. *s.g.* Charopa.

SYNOPSIS OF THE GENERA OF HELICIDÆ.

Sub-Family Macroogona.

Genitalia without flagellum. Eggs or embryonic shell large.
Vagina or spermatheca duct bearing a blind sack; lip of shell narrow or simple.
Shell discoidal. Pedinogyra.
Shell subtrochiform. Anoglypta.
Shell bulimoid.
Upper whorls spirally lirate, with crenulated suture.
Caryodes.
Upper whorls finely beaded or smoothish, suture even.
Panda.

Sub-Family Epiphallogona.

Genital system having an epiphallus and flagellum on penis, and no dart-sack and associated mucus gland.

Penis retractor inserted on epiphallus; penis without appendage.
Apex or whole shell with quincuncially arranged hair-scars; jaw ribbed. [CHLORITIS.]
Surface hairy, or marked with regular series of hair-scars to the apex. *Section* AUSTROCHLORITIS.
Apex not so sculptured.
Shell depressed, last whorl deeply deflexed in front; jaw smooth. [PLANISPIRA.]
Jaw ribbed. *s.g.* ANGASELLA.
Shell of thinner texture, basal lip more or less toothed. *Section* TRACHIOPSIS.
Shell various, generally densely granulated; jaw ribbed. THERSITES.
Shell conoidal, generally banded, the spermatheca having a long duct *s.g.* THERSITES.
Shell lense-shaped. *Section* THERSITES *(s.s.)*.
Shell depressed with conoidal spire, obliquely striate or hirsute. *Section* HADRA.
Shell globose, surface densely granulated all over. *Section* BADISTES.
Shell depressed, keeled, with corrugated and granulated surface. *Section* GLYPTORHAGADA.
Shell globose, surface smooth to the unaided eye. *Section* SPHÆROSPIRA.
Shell depressed globose, calcareous in texture, often multilineate. *s.g.* RHAGADA.
Shell globular, with wide columellar lip; the spermathecal duct short. *s.g.* XANTHOMELON.
Shell trochoidal, thinner, and mostly light colored. PAPUINA.

2. Ordovician Rocks in Queensland.

At the August meeting in 1893 I exhibited "a species of *Euomphalus* indicative of the Silurian epoch, obtained far to the east of the Macdonnell Range," at 20 miles west from Took's Waterhole in Cairns Range (vol. XVII., p. 354, 1893). The specimen alluded to is the impression of the upper surface of an Euomphaloid shell, which was obtained by Mr. South, Warden of the Gold-fields, then stationed at Alice Springs, at Cairns Range. The fossil was sent to Mr. East, and by him handed to me for determination. Among the fossils collected by me among the Ordovician rocks of the Larapintine region, when attached to the Horn Expedition, are several specimens of an *Euomphalus* or *Oriostoma*-like shell, either identical with or very closely allied to

the species indicated by the impression received from Cairns Range. This fact I communicated to the Government Geologist of Queensland, which indicated the extension of the Ordovician rocks to the borders of that province, and the probability of their occurrence within its boundary. In acknowledging the information, Mr. Jack writes, June 7, 1895 :—"What renders the question of more than usual interest at present is that in some of the bores in the neighborhood of Boulia there are enormous thicknesses of limestone which might possibly be either Ordovician or the older limestones, &c. (probably Cambrian), on which the Silurian lies unconformably. It is quite on the cards that there may be a barrier of Palæozoic rocks extending from the Cairns Range to the Cloncurry."

At a meeting of the Royal Society of Queensland, July 6, 1895, a paper was communicated by the Government Geologist on "Stratigraphical Notes on the Georgina Basin with Reference to the Question of Artesian Water," from which and the discussion which ensued we learn that important advances in stratigraphical geology, as far as Queensland is concerned, are the outcome of the little episode attached to the fossil impression from Cairns Range. Mr. Jack argued that Palæozoic and metamorphic rocks are continuous from the Cairns Range to the Cloncurry area, and consequently that the Lower Cretaceous area at the head of the Georgina River, as shown on the 1892 geological map, must be deleted. These Palæozoic rocks either outcrop or are very close to the surface. He bases these conclusions on the fact that unsuccessful bores have been put down at Carandotta, Chatsworth, Glenormiston, Marion Downs, and four on Tooleybuck Station ; also on the geological investigations in South Australia in the vicinity of the North-western border of Queensland. The only conclusion that can be drawn from this fact is that the country to the north of a line extending from the western boundary of the colony by the tropic of Capricorn to the Georgina River and thence north-eastward (perhaps not in a straight line) to the head of the Warburton River must be regarded as unfavorable for boring for artesian water.

In the discussion which followed, Mr. Gibb Maitland drew attention to the fact that 25,000 square miles of country, believed to be artesian, is now shown to be made up of much older rocks. The discovery of rocks with Silurian or Cambrian fossils on the western border of Queensland is one of the most important stratigraphical facts recently ascertained in Queensland. The oldest fossiliferous beds were, until quite recently, believed to be Devonian, though the occurrence of sedimentary beds lying unconformably beneath these was not unknown. The true age of the limestones of the Cairns Range and those met with in some of

the bores of the Georgina basin still remained unknown, and the solution of this problem would throw a great deal of light upon the physical geology of North-western Queensland.

3. The Age of the Hallett's Cove-Glacier.

The recent discovery that the glacier-path at Hallett's Cove passes beneath the escarpment of the marine Miocene erases an important coordinate factor in the production of the climatic conditions which prevailed during the Diprotodon-period. We cannot shift back the age of the Diprotodon, because the sediments which entomb the marsupial and its associates are certainly post-Miocene. The absence of glacial conditions does not, however, invalidate the argument of high pluvial conditions in Pliocene times, which is based on independent physical evidences. The fact that the glacier-path at Hallett's Cove is pre-Miocene should not force us to accept contemporaneity with the glacier-phenomena at Bacchus Marsh, admittedly of Permo-carboniferous age, which there seems a too-hasty disposition to concede; whilst the more or less incoherent "*till*" at Hallett's Cove is not comparable with the highly indurated glacial sediments at Bacchus Marsh; and, moreover, other interglacial periods are indicated in the stratified rocks of New South Wales and New Zealand. Moreover, the pronounced differences between Eocene and Miocene may lend some argument to uphold the view of a post-Eocene or intra-Miocene age of the Hallett's Cove glacier. The late Mr. G. Scoular (Trans. Roy. Soc., S. Aust. vol. VIII., pp. 36-48, 1886) thought that the more tropical aspect of the Eocene was gradually driven northward by an increase of cold, which finally eventuated in the depopulation of the marine area at the close of the Miocene period. In a certain sense the Eocene fauna is tropical, and it is certainly true that the Miocene fauna has a distinct modern facies, and, relatively to that of the same area before and after, is a much depauperated one. These circumstances may have been produced by a glacier-climate intervening between Eocene and Miocene, and continued into the latter. However, the problem must await solution until the discovery of organic remains in the stratified parts of the "till," which will determine also the condition of its deposition.

4. Jurassic Rocks in New South Wales.

A small patch of shales on the Talbragar River, at about 16 miles NN.E. from Gulgong, was discovered to be plant- and fish-bearing, and was reported on by Geological Surveyor Anderson in 1889. By him these fossiliferous beds were regarded as forming "an isolated lenticular patch in the horizontally-bedded

sandstones similar to the lenticular beds of grey shale which occur in the Hawkesbury sandstone near the coast."

The fish have been described by Mr. A. S. Woodward, of the British Museum, in a Memoir, just published by the Geological Survey of N. S. Wales, and the opinion therein expressed is that the fish are probably of Jurassic, not Triassic, age.

A re examination of the stratigraphical evidences by Mr. Pittman and Professor David has proved in favor of the conclusions arrived at on palæontological grounds by Mr. Woodward.

The fish-beds differ lithologically from any known rock in the Hawkesbury series; they repose on an eroded surface of the Hawkesbury Sandstone, and the uppermost bed contains pebbles of that formation.

The evidence supplied by the fossil plants, as provisionally interpreted by Mr. R. Etheridge, jun., implies a correlation with the Carbonaceous-series of Victoria and the Ipswich-series of Queensland.

Thus, now for the first time, rocks of Jurassic age are recognised in N. S. Wales.

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FROM THE AUTHORS.

A. Liversidge, M.A., F.R.S.—

Notes on some Australasian and other Stone Implements.

Boleite, Nantokite, Kerargyrite, and Cuprite from Broken Hill, N.S. Wales.

Sir F. von Mueller, F.R.S., &c.—

Select Extra-Tropical Plants.

LIST OF FELLOWS, MEMBERS, &c.

NOVEMBER, 1895.

Those marked (F) were present at the first meeting when the Society was founded. Those marked (L) are Life Fellows. Those marked with an asterisk have contributed papers published in the Society's Transactions.

Any changes in the addresses should be notified to the Secretary.

Date of Election.

HONORARY FELLOWS.

1857. BARKELEY, SIR HENRY, K.C.M.G., K.C.B., F.R.S., Royal Colonial Institute, London.
1893. COSSMANN, M., Rue de Maubeuge, 95, Paris.
1876. ELLERY, R. L. J., F.R.S., F.R.A.S., Government Astronomer Victoria, The Observatory, Melbourne, Victoria.
1890. *ETHERIDGE, ROBERT, Palæontologist to the Geological Survey of New South Wales, Sydney.
1853. GARRAN, A., LL.D., Sydney, New South Wales.
1893. GREGORIO, MARQUIS DE, Palermo, Sicily.
1855. HULL, H. M., Hobart, Tasmania.
1878. JERVOIS, SIR W. F. D., K.C.M.G., C.B., F.R.S., Ex-Governor of South Australia, London, England.
1855. LITTLE, E.
1879. *MUELLER, BARON F. VON, K.C.M.G., F.R.S., M. and Ph.D., F.G.S., F.R.G.S., F.C.S., C.M.Z.S., &c., &c., Government Botanist, Melbourne, Victoria.
1876. RUSSELL, H. C., B.A., F.R.S., F.R.A.S., Government Astronomer New South Wales, Sydney, N.S.W.
1894. *WILSON, J. T., M.D., Professor of Anatomy Sydney University.

CORRESPONDING MEMBERS.

1881. BAILEY, F. M., F.L.S., Colonial Botanist, Brisbane, Queensland.
1881. *CLOUD, T. C., F.C.S., Manager Wallaroo Smelting Works, South Australia.
1888, *DENNANT, JOHN, F.G.S., F.C.S., Inspector of Schools, Russell-street, Camberwell, Melbourne, Victoria.
1880. *FOELSCHE, PAUL, Inspector of Police, Palmerston, Northern Territory, Australia.
1881. GOLDSTEIN, J. R. Y., Melbourne, Victoria.
1880. *KEMPE, REV. J., Australia.
1893. *MCKILLOP, REV. DAVID, S.J., Superior Daly River Mission, Northern Territory.
1892. *MAIDEN, J. H., F.L.S., F.C.S., Curator Technological Museum, Sydney, N.S.W.
1888. *MASKELL, W. M., Wellington, New Zealand.
1886. NICOLAY, REV. C. G., Fremantle, Western Australia.
1880. *RICHARDS, MRS. A., Georgetown, South Australia.
1892. *SCHULZ, REV. LOUIS.
1883. *STIRLING, JAMES, Assistant Geological Surveyor, Victoria.
1893. *STRETTON, W. G., Palmerston, Northern Territory.

FELLOWS.

1887. Adcock. D. J., Adelaide, S.A.
1874. Angas, J. H., Adelaide, S.A.
1895. Ashby, Edwin, Adelaide, S.A.
1887. Bagot, John, Adelaide, S.A.
1893. *Bednall, W. T., Adelaide, S.A.
1887. *Blackburn, Rev. Thomas, B.A., Woodville, S.A.
1884. Boettger, Otto, Adelaide, S.A.
1886. *Bragg, W. H., M.A., Professor of Mathematics, University of Adelaide, S.A.
1882. Brown, L. G., Adelaide, S.A.
1883. *Brown, H. Y. L., F.G.S., Government Geologist South Australia, Adelaide.
1893. Brummitt, Robert, M.R.C.S., Eng., Kooringa, S.A.
1884. Bussell, J. W. F.R.M.S., North Adelaide, S.A.
1888. Chapman, R. W., M.A., B.C.E., Lecturer on Mathematics and Physics University of Adelaide, S.A.
1879. *Cleland, W. L., M.B., Ch.M., J.P., Assistant Colonial Surgeon, Resident Medical Officer Parkside Lunatic Asylum, Lecturer on Materia Medica University of Adelaide, Parkside, S.A.
1876. (L) Cooke, E., Commissioner of Audit South Australia, Adelaide, S.A.
1895. Cooke, John H., Adelaide, S.A.
1880. Cox, W. C., Semaphore, S.A.
1887. *Dixon, Samuel, Adelaide, S.A.
1876. Dobbie, A. W., Adelaide, S.A.
1893. Dudley, U.
1890. *East, J. J., F.G.S. (Corresponding Member, 1884.)
1871. Elder, Sir Thomas, K.C.M.G., Adelaide, S.A.
1886. Fleming, David, Adelaide, S.A.
1882. Fowler, William, Melton, Y.P., S.A.
1889. Fraser, J. C., Adelaide, S.A.
1880. *Goyder, George, Jun., F.C.S. Government Analyst South Australia, Adelaide, S.A.
1890. Gray, Rev. William, Mount Barker, S.A.
1887. Grasby, W. C., F.L.S., Agricultural College, Roseworthy, S.A.
1882. Henry, Alexander, M.D., Adelaide, S.A.
1891. *Holtze, Maurice, F.L.S., Director Botanic Gardens, Adelaide (Corresponding Member, 1882), Adelaide, S.A.
1883. *Howchin, Walter, F.G.S., Goodwood, S.A.
1893. James, Thos., M.R.C.S., Eng., Moonta, S.A.
1891. Johnson, J., M.D., F.R.C.S., Medical Officer Mount Gambier Hospital, Assistant Colonial Surgeon, Mount Gambier, S.A.
1853. (F) Kay, Robert, General Director and Secretary S.A. Public Library, Museum, &c., Adelaide, S.A.
1894. Kershaw, James A., Entomologist National Mnseum, Melbourne.
1884. Lendon, A. A., M.D., M.R.C.S., Lecturer on Forensic Medicine and on Chemical Medicine University of Adelaide, Hon. Physician Adelaide Hospital and Children's Hospital, North Adelaide, Adelaide, S.A.
1866. Lloyd, J. S., Adelaide, S.A.
1888. *Lower, O. B., F.Ent.S., Parkside, Unley, S.A.
1885. *Lucas, R. B., Adelaide, S.A.
1874. *Magarey, Hon. S. J., M.D., M.L.C., Adelaide, S.A.
1874. Mayo, G. G., C.E., Adelaide, S.A.
1882. *Meyrick, E. T., B.A., Ramsbury, Hungerford, Wilts, England.
1888. Molineux, A., F.L.S., Secretary Central Agricultural Bureau South Australia, Kent Town, S.A.

1859. (L) MURRAY, DAVID, Adelaide, S.A.
1884. MUNTON, H. S., Brighton, S.A.
1893. PERKS, R. H., M.D., F.R.C.S., Eng., Birksgate, S.A.
1883. PHILLIPS, W. H., Adelaide, S.A.
1886. POOLE, W. B., Adelaide, S.A.
1895. RAMAGE, REV. GRANVILLE, Norwood, S.A.
1885. *RENNIE, H. E., M.A., D.Sc., F.C.S., Professor Chemistry University of Adelaide.
1891. ROGERS, R. S., M.D., Adelaide, S.A.
1876. *RUTT, WALTER, C.E., Adelaide, S.A.
1891. SELWAY, W. H., JUN., Adelaide, S.A.
1886. SCOTT, JAMES L., Hyde Park, S.A.
1893. SIMSON, AUGUSTUS, Hobart, Tasmania.
1857. SMEATON, THOMAS D., Blakiston, Little Hampton, S.A.
1871. SMITH, ROBERT BARR, Adelaide, S.A.
1881. *STIRLING, EDWARD C., C.M.G., M.A., M.D., F.R.S., F.R.C.S., Lecturer on Physiology University of Adelaide, Hon. Director S.A. Museum, Hon. Surgeon Adelaide Hospital, Adelaide, S.A.
1893. *STREICH, VICTOR, F.G.S.
1876. *TATE, RALPH, F.L.S., F.G.S., Professor of Natural Science University of Adelaide
1886. *TEPPER, J. G. O., F.L.S., Entomologist S.A. Museum (Corresponding Member, 1878), Adelaide, S.A.
1894. *TURNER, A. JEFFERIS, M.D., Brisbane.
1889. VARDON, JOSEPH, J.P., Adelaide, S.A.
1878. *VERCO, JOSEPH C., M.D., F.R.C.S., Lecturer on the Principles and Practice of Medicine and Therapeutics and on Clinical Medicine University of Adelaide, Hon. Physician Adelaide Hospital, Adelaide, S.A.
1883. WAINWRIGHT, E. H., B.Sc., St. Peters College, S.A.
1878. WARE, W. L., Adelaide, S.A.
1879. WAY, EDWARD W., M.B., M.R.C.S., Lecturer on Obstetrics and Diseases Peculiar to Women and Children University of Adelaide, Hon. Physician Adelaide Hospital, Adelaide, S.A.
1859. WAY, SAMUEL J., D.C.L., Chief Justice and Lieutenant-Governor South Australia, Adelaide, S.A.
1882. *WHITTELL, HORATIO, M.D., M.R.C.S., F.R.M.S., President Central Board of Health and City Coroner Adelaide, Adelaide, S.A.
1886. WILSON, JOHN F.E.T.S., Goodwood, S.A.
1886. *ZIETZ, A., F.L.S., Assistant Director S.A. Museum, Adelaide, S.A.

ASSOCIATE.

1895. CLELAND, JOHN B., Parkside, S.A.

FIELD NATURALISTS' SECTION

OF THE

Royal Society of South Australia.

TWELFTH ANNUAL REPORT OF THE COMMITTEE, BEING FOR THE YEAR ENDING 30TH SEPTEMBER, 1895.

Evening Meetings.—Eight evening meetings have been held, at which the attendance has been very satisfactory, the average being greater than for many years past. The most noteworthy feature was the conversazione in October, 1894, which was the most successful and interesting gathering of the kind yet held by the Section, besides being on a more extensive scale than any of its predecessors. The special efforts made to ensure this result were evidently much appreciated by the large number of members and visitors who attended. A new feature of the winter session was the introduction of the "Question Box," when questions in Natural History subjects were asked and answered, and afterwards discussed by the members. Much information of a popular character was by this means obtainable. Papers or addresses have been contributed by Dr. R. H. Perks, F.R.C.S., and Messrs. R. Griffiths, J. W. Bussell, A. F. Robin, J. W. Mellor, J. G. O. Tepper, F.L.S., and T. D. Smeaton. The exhibits have covered a wide range both as to locality and nature of specimens. The Section has agreed to take part in the combined conversazione of Literary, Scientific, and Art Societies to be held in November next.

Excursions.—Eight excursions have been held, most of which have been well attended, and some have proved unusually pleasant outings. About 40 members and friends journeyed to Mount Lofty at the invitation of Mr. A. S. Magarey, chiefly to see the Recreative Reserve near that station, whilst interesting visits to Blakiston and Upper Sturt have been made. Hallett's Cove has been revisited, in order to inspect the fresh developments recently made there, and a dredging trip was also included in the outings. The weather on more than one occasion prevented some fixtures being carried out, and an excursion planned for the Burra (September 1), with the view of covering entirely

new ground, fell through owing to lack of numbers. The members of the Section have been most kindly entertained at excursions during the year by Dr. E. C. Stirling, F.R.S., &c., and Messrs. T. D. Smeaton, J.P., and J. H. Symon, Q.C.

Protection of our Native Fauna and Flora.—A separate report from the Native Fauna and Flora Protection Committee states what has been done in this direction during the past year.

Proceedings.—It has been found impracticable as yet to issue the "Proceedings" of the last two and the current years, but it is hoped that ere long the continuity of our printed transactions will be restored.

Financial.—From the accompanying statement of accounts it will be seen that the amount received from subscriptions has been greater than last year, and that the expenditure, chiefly through the expenses of the conversazione (October, 1894), coming into the current financial year have also been larger. In other respects the work of the Section has been carried on with due regard to economy.

Membership.—There have been twelve admissions to the Section during the year, whilst fifteen names have been removed from various causes, the number now on the roll being eighty-seven.

R. H. Perks, Chairman.
W. H. Selway, Jun., Hon. Sec.

Adelaide, 16th September, 1895.

FIELD NATURALISTS' SECTION OF THE ROYAL SOCIETY OF SOUTH AUSTRALIA.

Receipts and Disbursements for the year 1894-95.

Dr. Receipts.	£	s.	d.	Cr. Disbursements.	£	s.	d.
To Balance brought forward	1	16	10	By Postages and Sundries	3	15	0
" Grants from Royal Society	18	0	0	" Conversazione	9	4	11
" Subscriptions	16	10	0	" Printing	3	5	0
				" Advertising	1	12	6
				" Attendance	1	5	0
					£19	2	5
				" Subscriptions, as per contra, handed over to Royal Society	16	10	0
				" Balance in Hand	0	14	5
	£36	6	10		£36	6	10

Audited and found correct,

THOS. EVANS, F.S.A.I.A.
THOS. FABIAN, } Auditors.

Adelaide, September 16, 1895.

W. H. SELWAY, Jun., Hon. Secretary and Treasurer.

ASTRONOMICAL SECTION

OF THE

Royal Society of South Australia.

THIRD ANNUAL REPORT.

Since presenting the last Annual Report this Society has endeavored to forward the object for which it was founded, viz., the encouragement of a popular interest in the science of astronomy.

The roll of membership has kept up, and is (notwithstanding unavoidable removals) slightly over that of last year.

During the past twelve months five general meetings have been held, and the Committee met six times for the transaction of business.

In the early part of the session a new departure was made by the introduction of a question box, the contents of which have provoked discussion on a variety of subjects, as "The effects of the tides on the earth's rotation," "Non-luminous bodies in space," "The methods by which terrestrial gravity is ascertained," "The latest method for determinating difference in longitude," "The refractor and reflector telescopes," "The best method of constructing a planisphere," "The motion of the stars in the line of sight as measured by the spectroscope," "Method of determining the right ascension and declination of stars," "On the changes of gravity at different altitudes," "The dividing powers of the refractor telescope," "The way of deducing the progressional motion of the perigree from the time of perihelion passage and the longitude as given in the Nautical Almanac," "Why the moon appears larger on the horizon than when at its highest altitude," and "Why stars scintillate and the planets do not."

In November last Mr. J. W. H. Hullett gave a paper on the "Determination of the Orbits of Comets and their Elements."

The astronomical notes have been published monthly and a copy sent to every member.

Adopted at annual meeting held at Adelaide Observatory 24th September, 1895.

C. Todd, President.
W. E. Cheesman, Hon. Secretary.

ASTRONOMICAL SECTION OF THE ROYAL SOCIETY OF SOUTH AUSTRALIA.

Receipts and Disbursements for Year 1894-5.

Dr	£	s.	d.	Cr.	£	s.	d.	£	s.	d.
To Balance in hand	0	3	9	By Printing Monthly Notes	2	8	0			
" " Bank	7	19	3	" Stationery and Type-writing	0	11	0			
" Grants from Royal Society	13	0	0	" Postage	2	4	7			
" Subscriptions	7	15	0	" Blackboard and Guard-book	1	10	0			
" Interest	0	5	8					6	13	7
				" Subscriptions paid over to the Royal Society				9	12	6
				" Savings Bank				11	4	11
				" Balance in hand				1	12	8
	£29	3	8					£29	3	8

Audited and found correct,
RICHD. GRIFFITHS.
Sept. 23, 1895.

C. TODD, President.
W. E. CHEESMAN, Hon. Treasurer.

MALACOLOGICAL SECTION

OF THE

Royal Society of South Australia.

FIRST ANNUAL REPORT, 1895.

The preliminary meeting was held on September 20th, 1894, when it was resolved—(1) That the name of the Section be the Malacological Section of the Royal Society of South Australia. (2) That the annual subscription from members of the Royal Society shall be five shillings, and from others, if living within a radius of ten miles of Adelaide, shall be ten shillings; if beyond that distance, five shillings. (3) That meetings shall be held on the fourth Tuesday in each month. (4) That the Section shall annually elect its Chairman and Secretary; that the whole Section shall at present constitute its Executive Committee. (5) That a report of the proceedings of the Section, and original papers by its members, approved by the Council of the Society, shall be printed in the Transactions of the Royal Society, and that a copy of such report and papers shall be distributed to each member of the Section. The Section will secure about 50 copies of all papers printed, as a stock for sale to future members of the Section and others.

It was further resolved that the nomination of applicants for membership shall take place at an ordinary meeting, and the election at the next meeting. This shall be by ballot, and one black ball in three shall exclude the applicant.

Two new members have been elected, Mr. M. Maughan and Mr. A. Gosnell.

Twelve meetings have been held, and the same officers were at the last meeting elected for another year.

The work done has consisted chiefly in a critical revision of the Marine Gasteropods of South Australia, taking as a basis for discussion Mr. Adcock's List of Species of Aquatic Mollusca, 1893; the first 84 of which have been examined. The results

have been, in part, embodied in a paper by the Chairman on a Revision of the Marine Gasteropods of South Australia, printed in part i., vol. XIX. of the Transactions of the Royal Society, and it is anticipated that a series of similar papers will follow.

Prof. Tate exhibited a new species of Arcoperna, a worn specimen of *Voluta Roadknighti*, and an example of *Solarium Reevei* from Tasmania; collected by Mr. May.

Dr. Perks showed *Mesodesma erycina*, Lam., from the Grange Beach, St. Vincent Gulf, and Mr. Bednall recorded it from Aldinga.

Mr. Bednall—Specimens of *Trophon squamosissima*, Ten.-Woods, allied to, if not a variety of, *T. Hanleyi* from South Australia and Tasmania.

Mr. Adcock—Examples of *Clanculus Aloysii*, Ten.-Woods, from the South-East, and a *Crepidula aculeata* found by Mr. Ashby at Middleton.

ROYAL SOCIETY OF SOUTH AUSTRALIA—MALACOLOGICAL BRANCH.

Balance-Sheet, 1894-5.

Receipts	£	s.	d.	Payments.	£	s.	d.
To Subscriptions received	2	10	0	By Caretaker	1	0	0
" Grant from Royal Society	2	0	0	" In hand for Current Expenses	1	0	0
				" Balance	2	10	0
	£4	10	0		£4	10	0

JOS. C. VERCO, Chairman.

ROBERT PULLEINE, Hon. Sec. and Treasurer.

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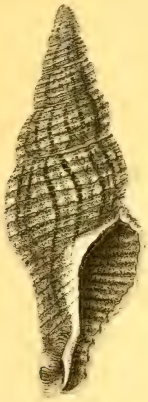

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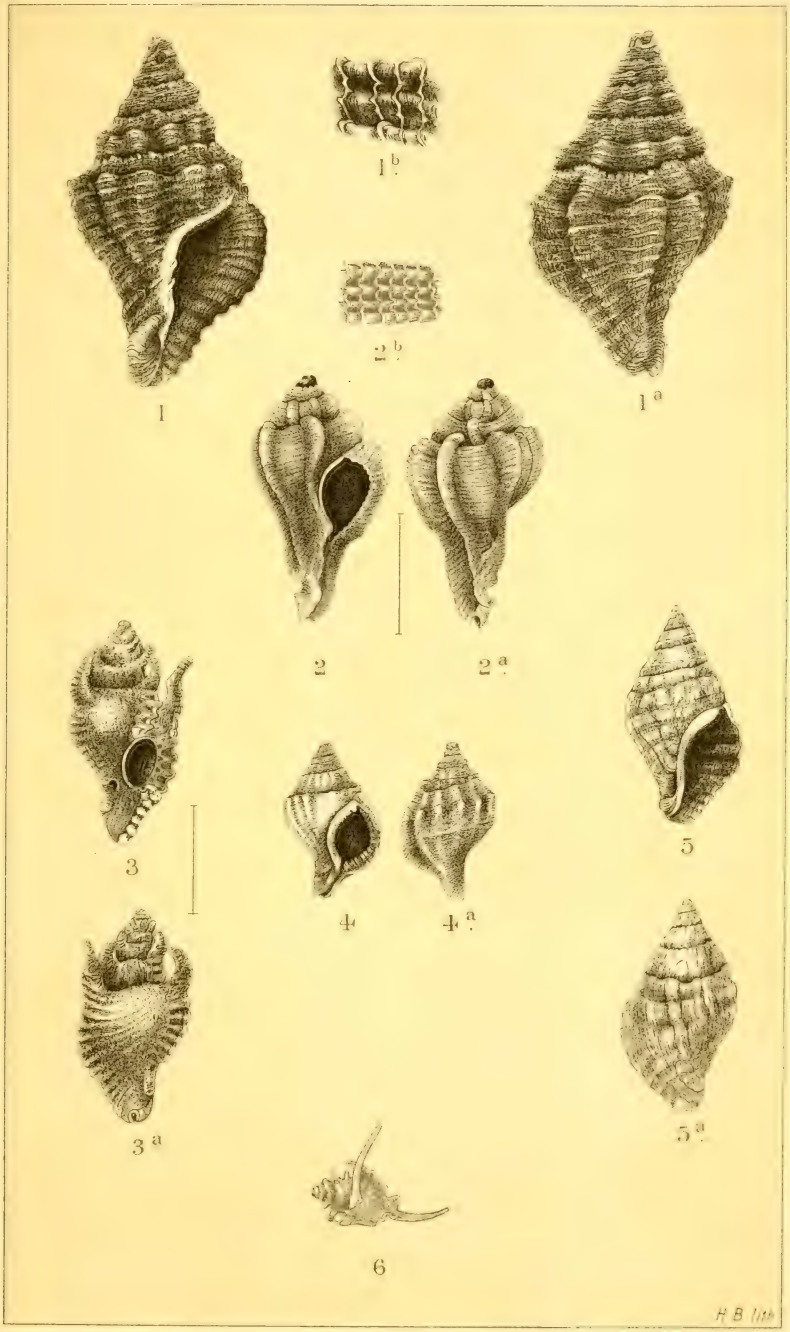
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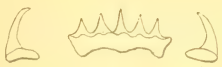

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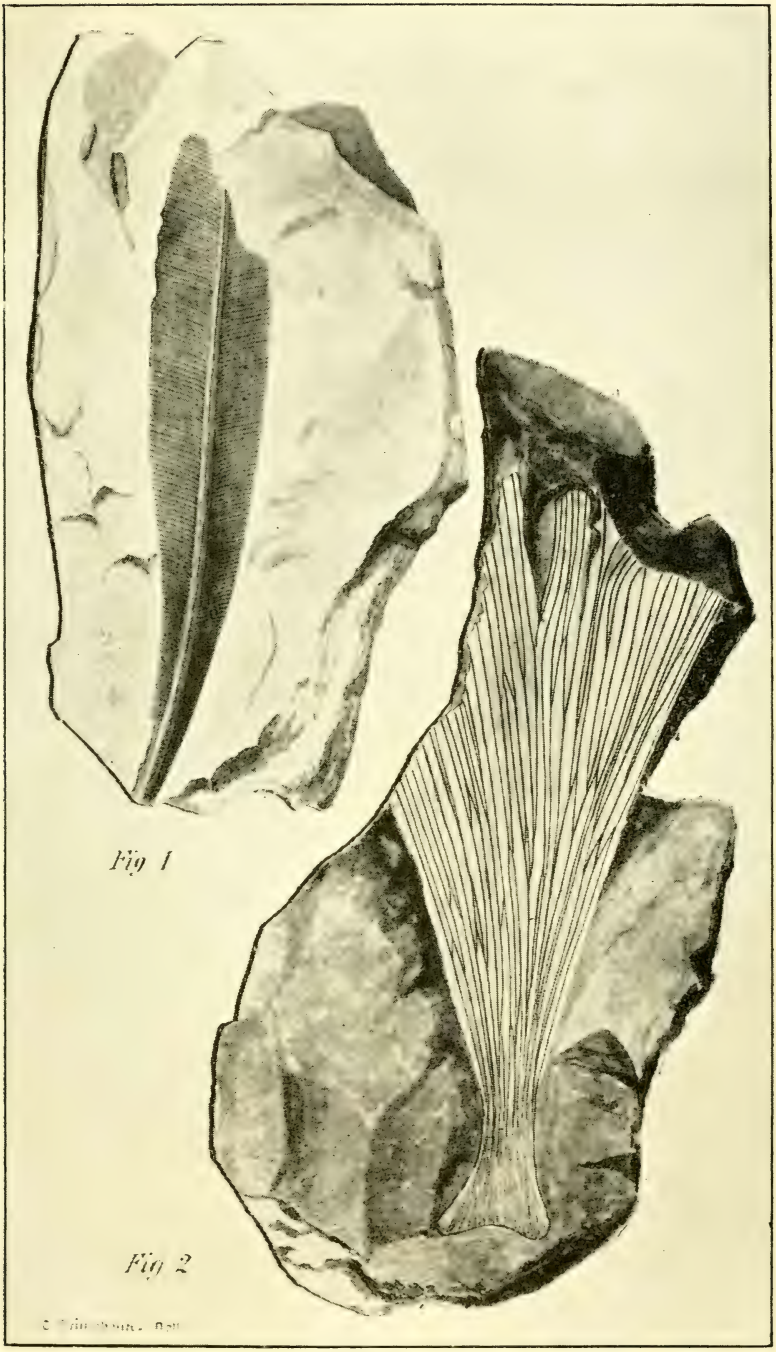

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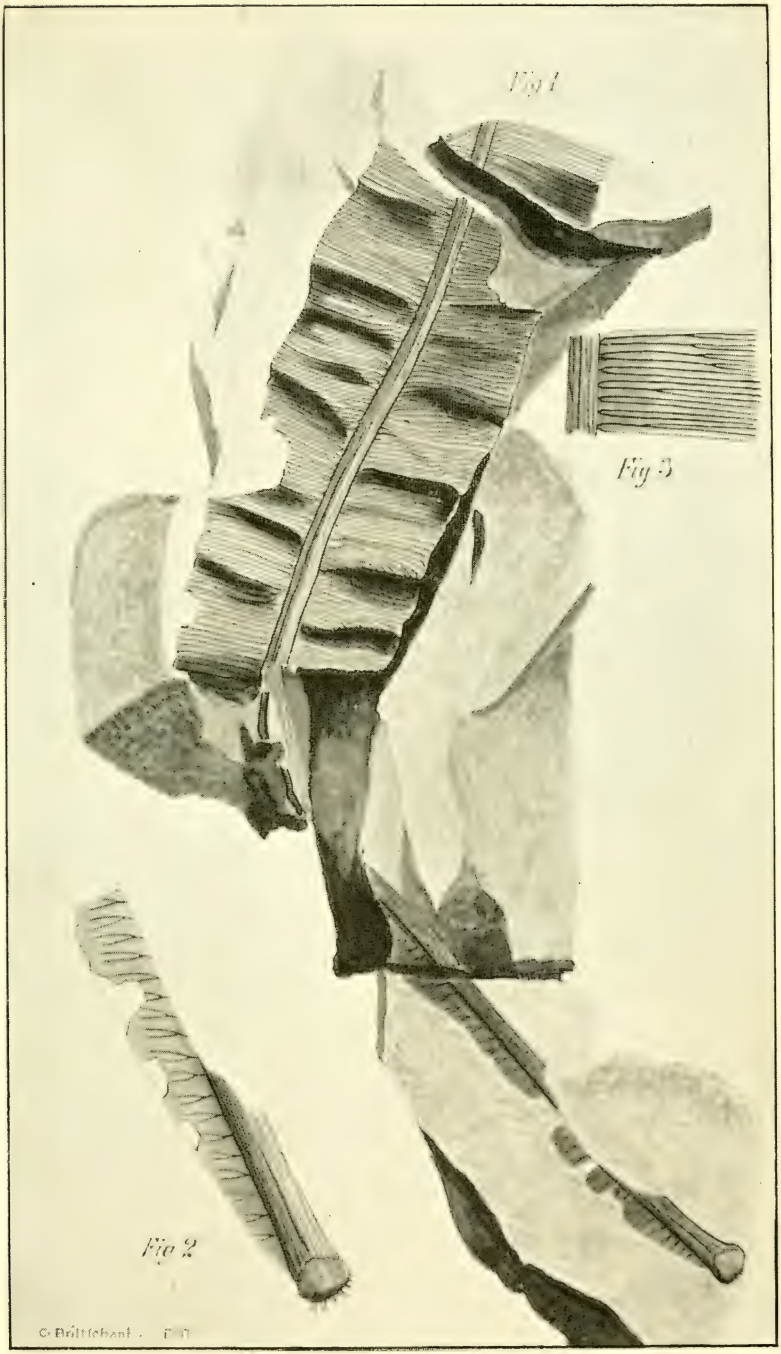
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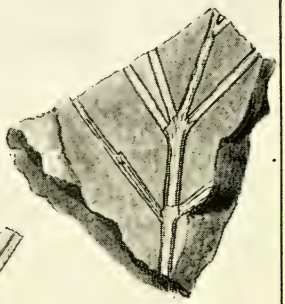

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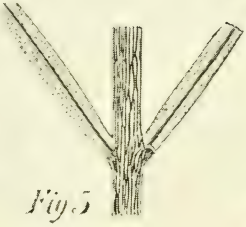

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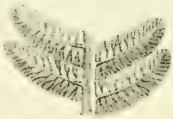

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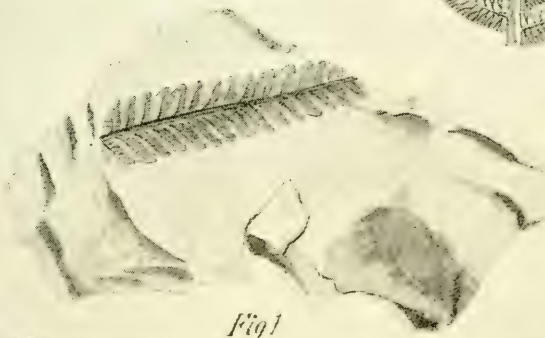

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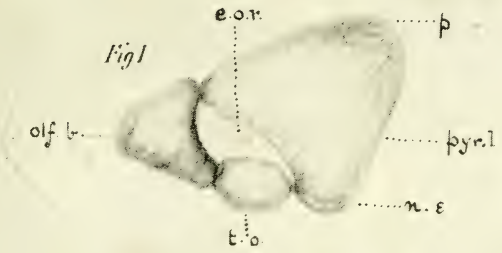

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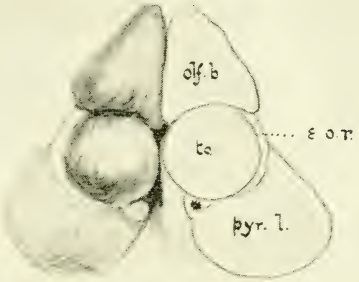

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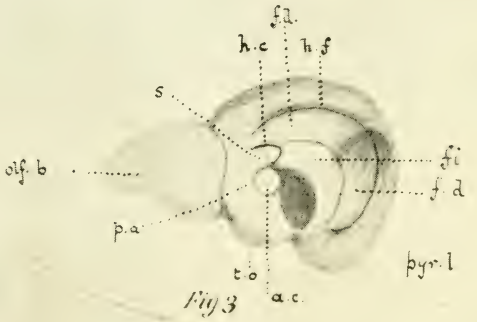

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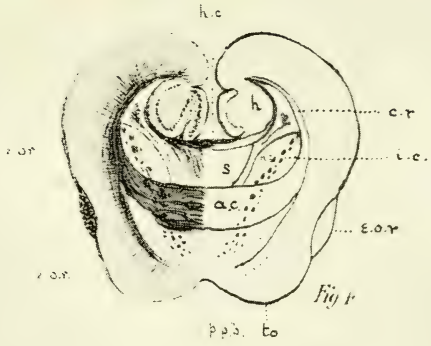
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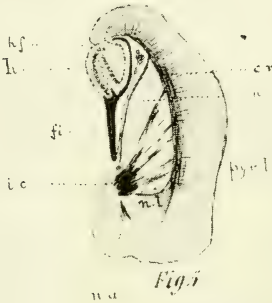
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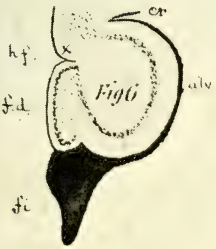
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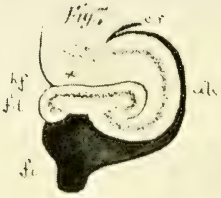
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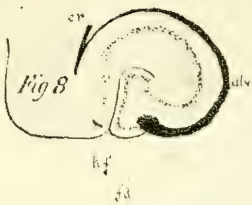
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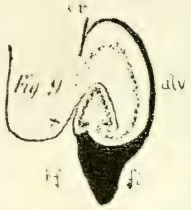
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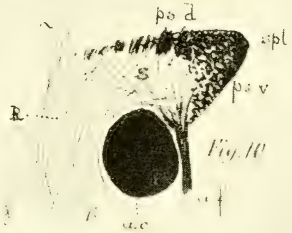
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VOL. XIX., Part I.

[With Three Plates,]

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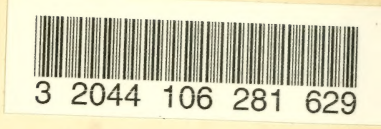
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